The Power of Formative Assessment

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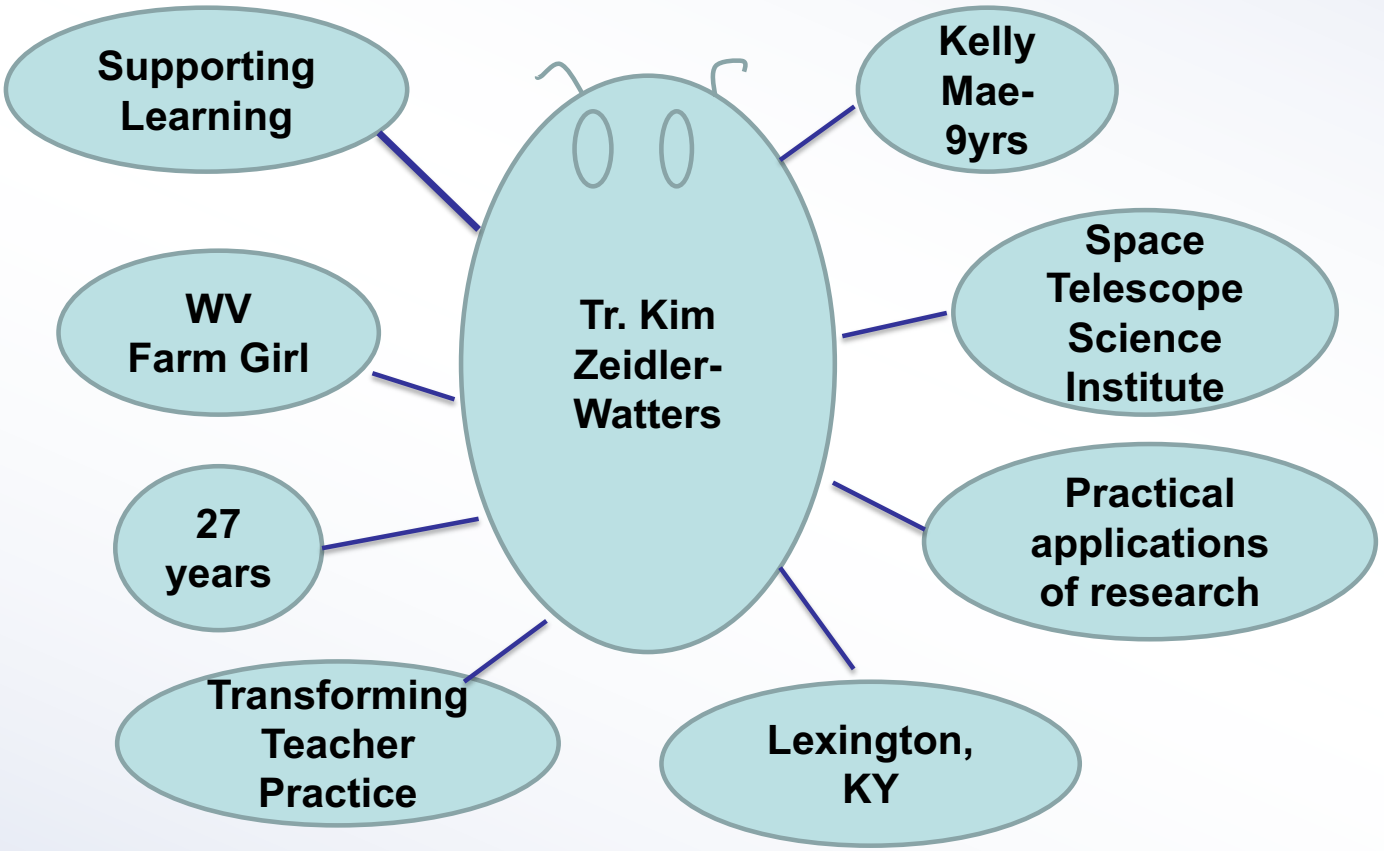
Spider: Eight things about me



Create Your Own Spider

Share 8 Things About You

Include at least three things you do in education not just who you are and your title

Discussion Partners

- Using the Parallel Partner sheet. (see online handout)
- Stand up and walk away from your table.
- Find four partners/team members, that you will meet with at various times during our learning time together. As you meet each team member, write their name down on a sheet of paper, introduce yourself and share some things about yourself from your spider.

  Note: Make sure you can identify each partner.
- When you have found all four partners, come back to your table.

Group Norms

- Engage fully
- Speak honestly
- Contribute your ideas productively
- Keep student success in mind
- Use the rule of 2 feet
- Please remember electronic device etiquette

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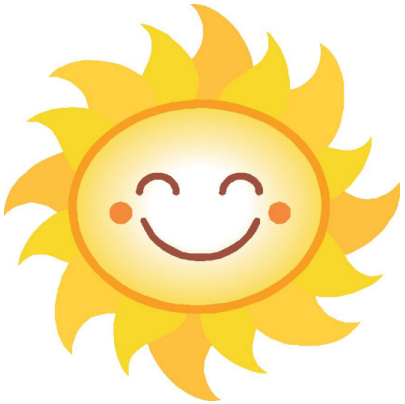
TODAY is . . .



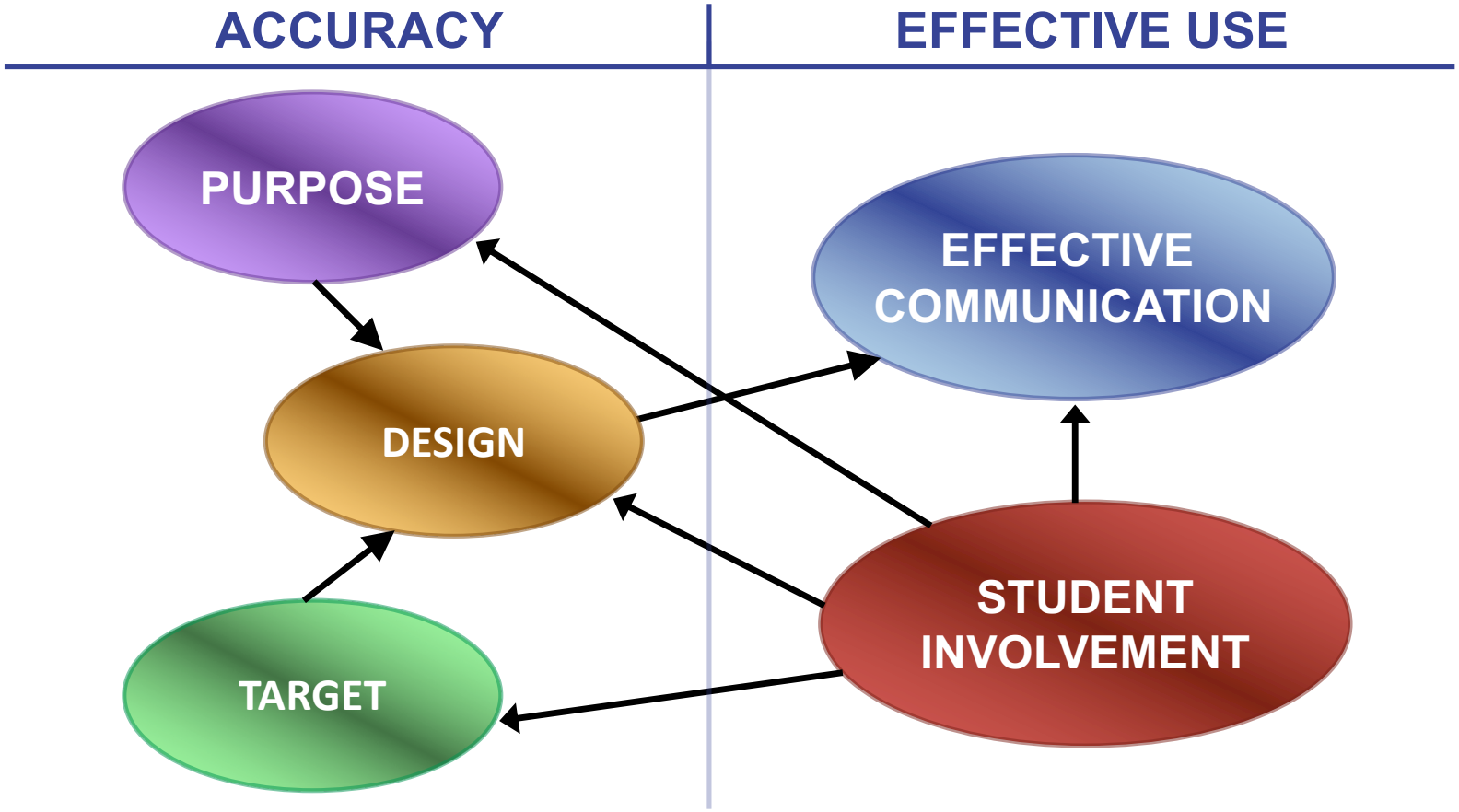
A GREAT DAY TO BE WRONG!!!!!!!!

Session Description

Explore formative assessment practices and strategies that support students learning and self and peer assessment that is supportive of them mastering the targets.

- Where am I going?
- Where am I now?
- How can I close the gap?
- How will I know I'm getting there?
- How can I keep it going?

5 Keys to Accurate Classroom Assessment



Pearson, *Classroom Assessment for Student Learning*.

The Power of Formative Assessment

Knowledge	Habits of Mind
• Why the formative assessment *process is one of the most* powerful set of practices a teacher can implement. • What is the relationship between formative assessment and student motivation. • Practices and Strategies to support implementation of the formative assessment process in the classroom.	• Develop a growth mindset • Exhibit positive interdependence and individual accountability
Understanding	**Skills/Be Able To Do**
• Improving practice takes "know-how"—both knowledge of what works and practical strategies to implement the knowledge	• How to use strategies to support student learning. • Experience strategies to know why the formative assessment process is powerful and supports learning.

What is it that we need to know and be able to do:

What will I be able to do when I've finished this lesson?

Utilize the formative assessment process to support student learning.

What do I need to learn so I can hit this target?

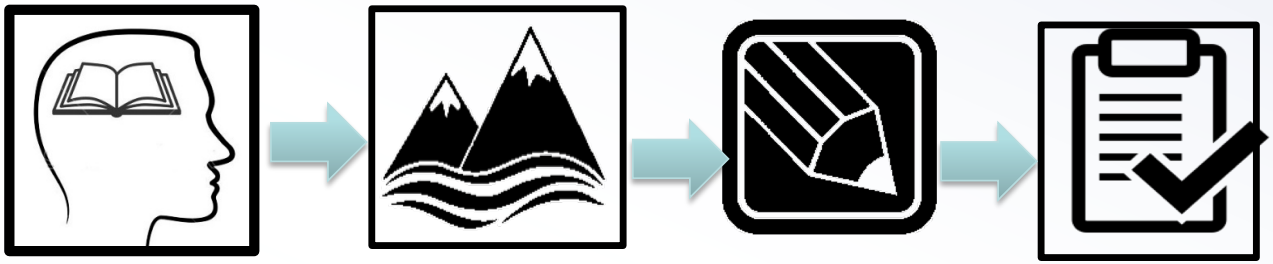
- Why the formative assessment *process is one of the most* powerful set of practices a teacher can implement?
- What is the relationship between formative assessment and student motivation?
- Five high yield practices and strategies to support implementation of the formative assessment process in the classroom.

What will I do to show that I understand the target?

Develop a personal action plan to apply the formative assessment process and strategies to support learning.

Personalizing Your Learning…Why You Are Here?

Write a sentence or two describing a goal or what you hope to get out of this session. Then, jot down some steps you might take to reach your goal.



We Know

Research-Based Practice

The Challenge

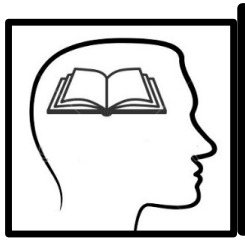
But…

The Solution

Tools

The Evidence

Looks like…



The Research-Based Practice

Formative Assessment

How do we improve student achievement?

Ideas for Improving Student Achievement

- Additional funding
- Smaller class sizes
- Higher teacher salaries
- Better facilities
- Stronger parental support
- Funding for conferences and workshops
- More access to technology
- More time
- Less accountability
- Lower poverty rates

- A collaborative culture in which teachers work together in teams to analyze student achievement
- Monitoring student learning on a frequent and timely basis through the use of formative assessments
- Strong parent partnerships based on open communication regarding the progress of students
- Meaningful and timely feedback
- Academic goals for every student that are clear and focused
- Common planning
- Interventions that give extra time and support to struggling students

Scaling the Assessment Literacy Ladder

Why assess students?

- ✓ To gather evidence of student learning
- ✓ To inform instruction
- ✓ To motivate students and increase student achievement

Shifts in Assessment

From assessing to learn what students do not know	→	To assessing to learn what students understand
From using results to calculate grades	→	To using results to inform instruction
From end-of-term assessments by teachers	→	To students engaged in ongoing assessment of their work and others
From judgmental feedback that may harm student motivation	→	To descriptive feedback that empowers and motivates students

FORMATIVE ASSESSMENT is…..

the process used by teachers and students to recognize and respond to student learning in order to enhance that learning <u>during the learning.</u>

Cowie & Bell 1999

An educational positioning system

- A good teacher
  - Establishes where the students are in their learning
  - Identifies the learning destination
  - Carefully plans a route
  - Begins the learning journey
  - Makes regular checks on progress on the way
  - Makes adjustments to the course as conditions dictate

Teachers who have these capacities orchestrate effective learning.

Why Formative Assessment?

- **.4 to .7 Gain**
- .7 Standard Deviation Score Gain=
  - 25 Percentile Points on ITBS (middle of score range)
  - 70 SAT Score Points
  - 4 ACT Score Points

Largest Gain for Low Achievers

(Black & Wiliam, Inside the Black Box, 1998)

AP Press Release

PRESS RELEASE

For Immediate Release
Wednesday, September 21, 2011

Contact: Joanne Lang
Phone: 859-576-3282
Email: jlang@kstc.com

Clay County High School Shows Greatest AP Gain in National Program

Lexington, KY (September 21, 2011) – Among the 44 Kentucky public schools participating in AdvanceKentucky, Clay County High School led the way with a one-year growth of **634 percent** in Advanced Placement (AP)* math, science and English (MSE) qualifying scores – from 11 to 81**.** This number is the best in the state among participating program schools with at least **10** qualifying scores from the previous year. Growth like this has not been seen in AdvanceKentucky's existence to date.

Gregg Fleisher, National AP Training and Incentive Program Director of the National Math and Science Initiative (NMSI), said about the results, "Considering both raw number and percent increases, in 2011 Clay County High School had the single greatest year in the history of the AP Training and Incentive Program, which dates back to 1990 involving hundreds of schools in seven states. We applaud the efforts of the entire district and community, and are proud to support their efforts."

AP Calculus
Multiple Choice Section

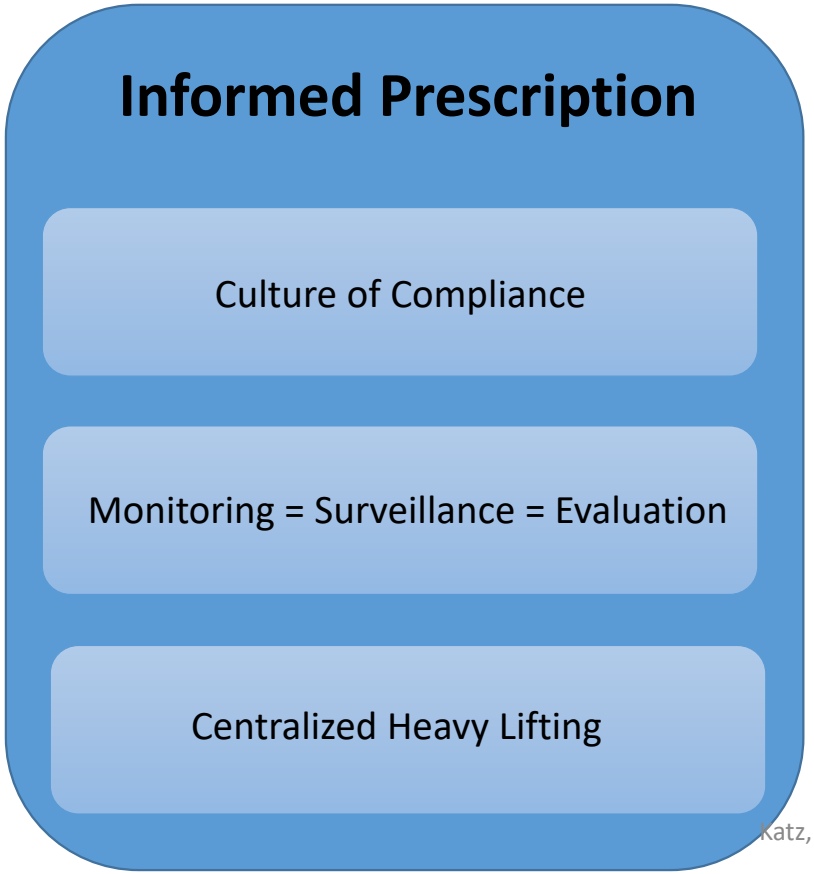
2010 CCHS MEAN	2011 CCHS MEAN
6.4	29.1
(note: Global Mean 21.4)	(note: Global Mean 27.6)

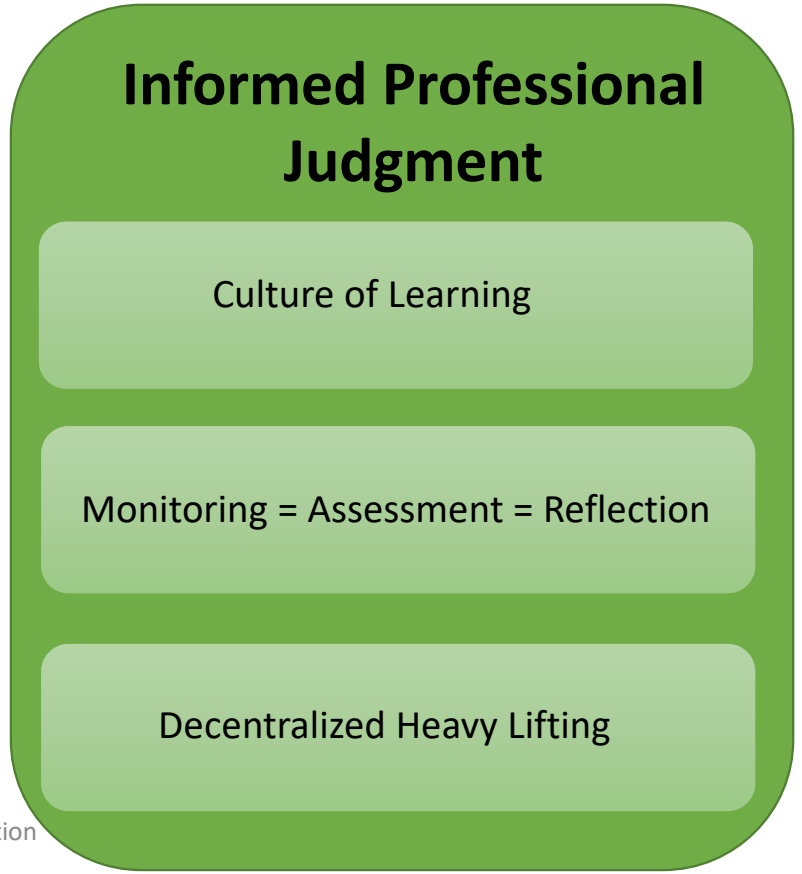
Clay County High School's AP Calculus Exam Results

School Year	# of Students enrolled	# of students scoring 3	# of students scoring 4	# of students scoring 5	Average Score
2009-2010	16	1	0	0	1.188
2010-2011	19	8	3	2	2.895

The Differentiation Challenge

Who does the “Heavy Lifting”?





Katz, Intentional Interuption

Visible Learning Research by John Hattie

	Class Size
	Teacher/Student Relationship
	Feedback
	Homework
	Ability Grouping
	Classroom Discussion
	Moving Schools
	Matching Style of Learning
	Meta-cognitive Strategies
	Assessment Literate Students

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Visible Learning, John Hattie

What Research Indicates . . .

Assessment Literate Students	1.44
Classroom Discussion	0.82
Feedback	0.75
Teacher/Student Relationships	0.72
Meta-cognitive Strategies	0.69

Homework	0.29
Class Size	0.21
Matching Styles of Learning	0.17
Ability Grouping	0.12
Moving Schools	-0.34

John Hattie, 2012

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Visible Learning, John Hattie

Hattie's Effect Size work
(This image is from John Hattie's website)

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Partner 1

1. Jot down two key learnings you are taking from the what we know section of this morning.
2. Meet with your partner 1 to share your thinking.

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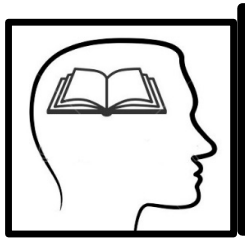
What's Wrong With This Picture?

What's Wrong With This Picture?

Clear Learning Targets

- Individually, draw the front of a penny.
- Include as many details as you can without looking at one.
- Do not compare with a partner until instructed.


IN GOD WE TRUST
LIBERTY
1991



The Research-Based Practice

Learning Targets

Five “key strategies”…

- **Clarifying, understanding, and sharing learning intentions**
  - curriculum philosophy
- Engineering effective classroom discussions, tasks and activities that elicit evidence of learning
  - classroom discourse, interactive whole-class teaching
- Providing feedback that moves learners forward
  - feedback
- Activating students as learning resources for one another
  - collaborative learning, reciprocal teaching, peer-assessment
- Activating students as owners of their own learning
  - metacognition, motivation, interest, attribution, self-assessment

(Wiliam & Thompson, 2007)

Teacher clarity is critical. Eminent educators, Dylan Wiliam and John Hattie agree that you must be very clear about what you want your students to learn. You need to know exactly what you want them to understand and what you want them to be able to do. More importantly, you need to ensure that your students are equally clear about what they must learn and how they can prove they have learnt it.

In fact, Hattie's review of research showed that teacher clarity has an effect size of d = 0.75.

Assessment *for* Learning:

Formative assessment practices that include
the student
as crucial decision-maker

Teacher and Student Questions about Learning Targets

- Where am I going?
- Where am I now?
- How can I close the gap?
- How will I know I'm getting there?
- How can I keep it going?

Activity: *Seven Strategies* by Jan Chappuis

Task:

1. Assign a different strategy to each person at your table to read. Continue assigning until all strategies are covered.
2. Appoint a table monitor to pay attention to the time.
3. Read the summary of your assigned strategy(ies), making note of what is most important about that strategy. Also, think of an example that illustrates the strategy. Be prepared to explain the strategy and your example to others at your table. (5 minutes)

Seven Strategies continued

Beginning with strategy 1, share your explanations and examples with the group at your table. As you listen, note ideas that are familiar to you and those that are new. (10 minutes).

Aspects of formative assessment

<table>
<tr><td></td><td>Where the learner is going</td><td>Where the learner is</td><td>How to get there</td></tr>
<tr><td>Teacher</td><td rowspan="3">Clarify and share learning intentions

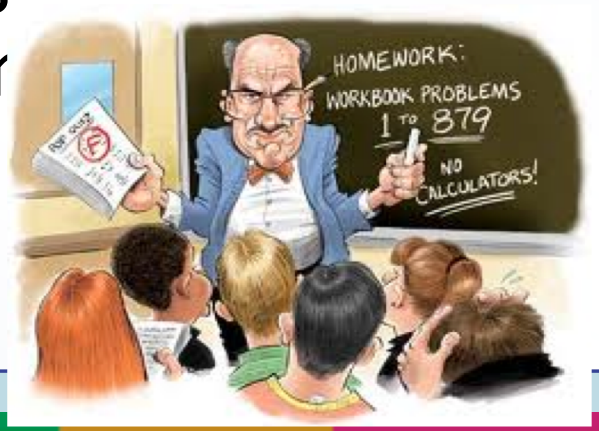
Understand and share learning intentions

Understand learning intentions</td><td>Engineering effective discussions, tasks and activities that elicit evidence of learning</td><td>Providing feedback that moves learners forward</td></tr>
<tr><td>Peer</td><td colspan="2">Activating students as learning resources for one another</td></tr>
<tr><td>Learner</td><td colspan="2">Activating students as owners of their own learning</td></tr>
</table>

- "There is a body of research that indicates that when students are given *learning goals*, goals that describe the intended learning, they perform significantly better than students who are given *performance goals*, goals that focus on task completion…It focuses their attention on learning by helping them understand the assignment is the *means* and the learning is the *end.*"
  - *Seven Strategies of Assessment for Learning,* pg. 18

Teachers who truly understand what they want their students to accomplish will almost surely be more instructionally successful than teachers whose understanding of hoped-for student accomplishr are murky."

-W. James Popham



Students who can identify what they are learning significantly outscore those who cannot.

Robert J. Marzano

We know that we need to engage students directly in the learning and assessment process so that they understand expectations and are able to monitor their own learning.

When teachers shares targets for student learning, students can see more easily the connections between what they are doing in class and what they are supposed to learn. They can gauge their starting point in relation to the learning targets and determine what they need to pay attention to and where they might need help from the teacher or others.

Partner 2

1. Take a moment and think about your personal plan. Based on the experiences you just participated in what ideas are rolling around in your head now?
2. Meet with your partner 2 to discuss.

The Challenge

What Are the “Buts”?

What challenges of practice can you identify based on this data?

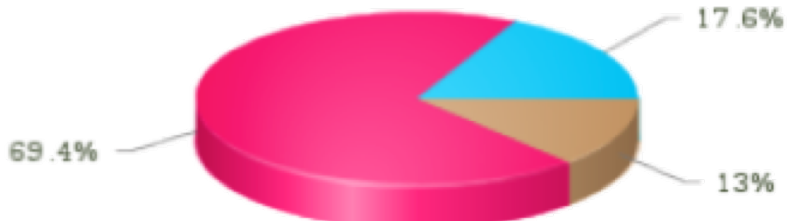
Examples of Classroom Learning Objectives

What does the data tell us?

Setting Objectives (Based on 118 walkthroughs)		
Setting Objectives	**Selected**	**%**
1. Posted learning objectives are specific but not restrictive and are in student-friendly language.	79	66.9%
2. Posted learning objectives are based on standards.	72	61%
3. Teacher references the learning objectives.	49	41.5%
4. Students personalize the learning objectives.	9	7.6%
5. Students use the objectives to monitor their own learning.	0	0%

Item Name	SEL	%
1. Articulated Learning Objective(s)	19	17.6%
2. Partially Articulated Learning Objective(s)	75	69.4%
3. Could Not Articulate Learning Objective(s)	14	13%
Total	**108**	**100%**

Student Interview (what and why?)

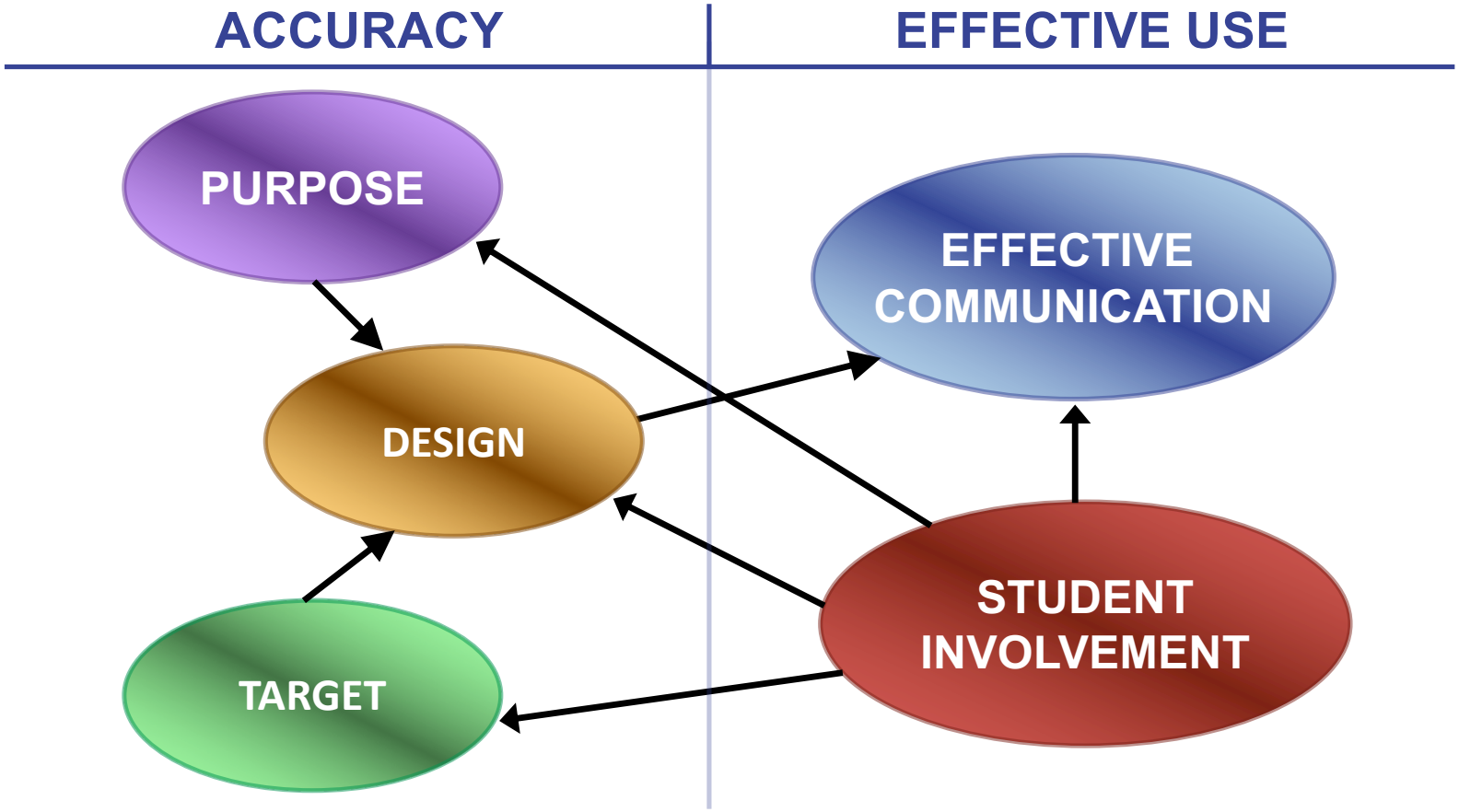


The Background and Strategies to Address the Challenge

Learning Targets

What do you currently know or what questions do you have about the role of learning targets in the classroom?

5 Keys to Accurate Classroom Assessment



Pearson, *Classroom Assessment for Student Learning, Stiggins and Chappuis*.

Key 1: Clear Purpose

- Who's going to use the information?
- How will they use it?
- Do our assessment practices meet students' information needs?

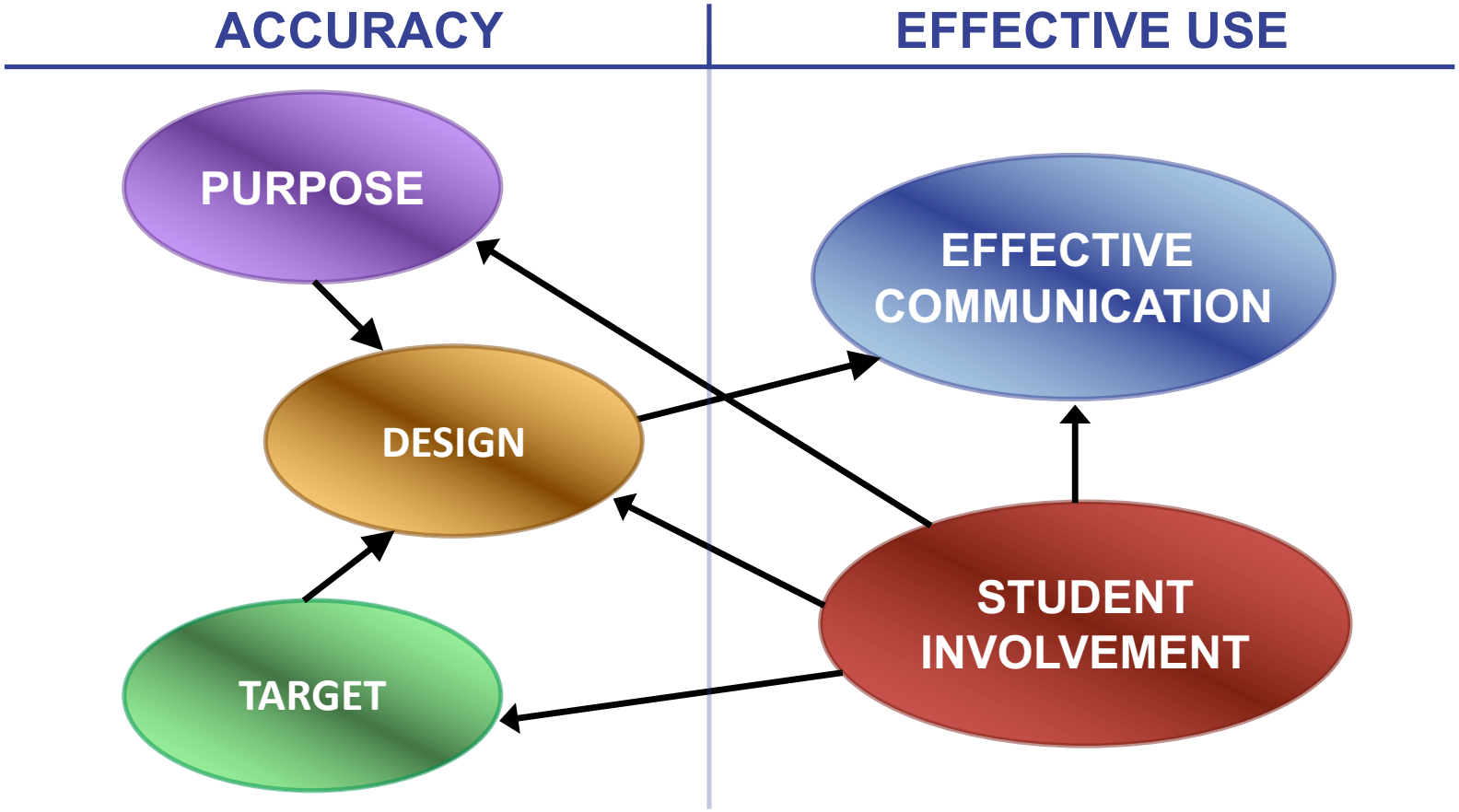
Key 1: Clear Purpose
Big Ideas

- Different people have different information needs.
- Students are crucial decision-makers whose information needs must be met.

Student Needs

- Know what high quality work looks like (Strategy strong and weak models)
- Be able to objectively compare their work to the standard
- Have a store of tactics to make work better
  - Sadler, 1989

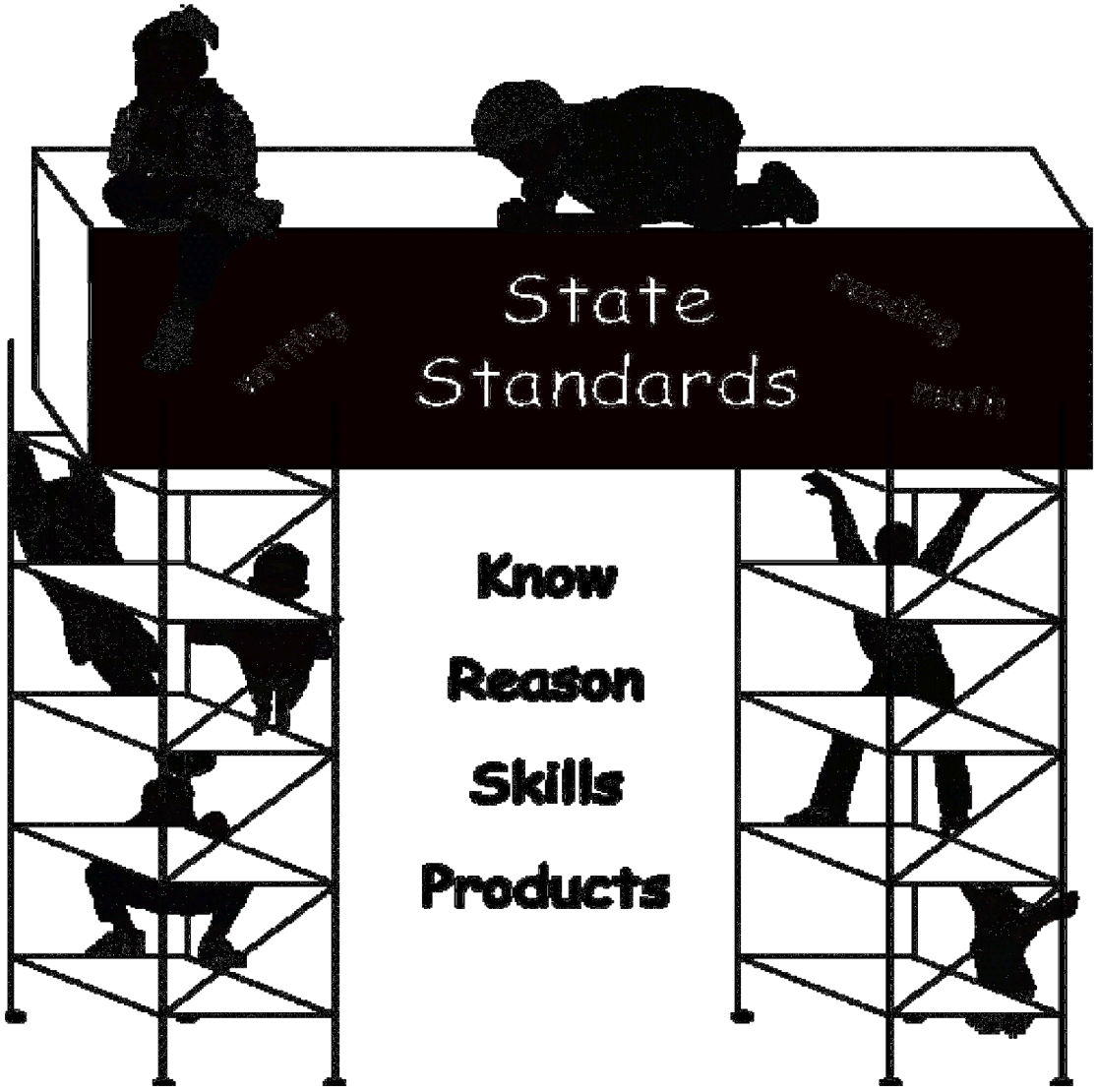
5 Keys to Accurate Classroom Assessment



Pearson, *Classroom Assessment for Student Learning,* Stiggins and Chappuis.

Key 2: Clear Targets

- Are our targets clear to us? Are they clear to our students?
- Can we identify what kinds of targets we have?
- Do our assignments and assessments reflect the targets students had opportunity to learn?


State
Standards
Know
Reason
Skills
Products

QUESTION

What is the difference between a

STANDARD

Learning Objectives

and a

LEARNING TARGET?


Deconstruction of Standards
Learning Objectives
Learning Targets
Assessment
Instructional
Plan

Grade Level/ Course: **2nd Grade**	
Standard with code:	**2. MD. 8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.** *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*
Domain:	**Measurement and Data**
Cluster:	**Work with time and money**
Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product	

Knowledge Targets	Reasoning Targets	Performance Skills Targets	Product Targets
• **Know the monetary values for a dollar bill, quarter, dime, nickel, and penny.** • **Use the $ and ¢ symbols appropriately.** • **Add and subtract monetary values.** • **Recognize signal words in word problems to cue arithmetic operations.**	• **Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies.**		

Make sense of problems and persevere in solving them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

An Example

- STANDARD: An excellent golf swing
- TARGETS:
  - Proper placement for feet (stance)
  - Proper grip while maintaining stance
  - Swing A, B, C (3-par
- ACTIVITIES:
  - Watch videos of great golfers and imitate their stance

When should these be added and/or developed?

Is it a Target or Not?

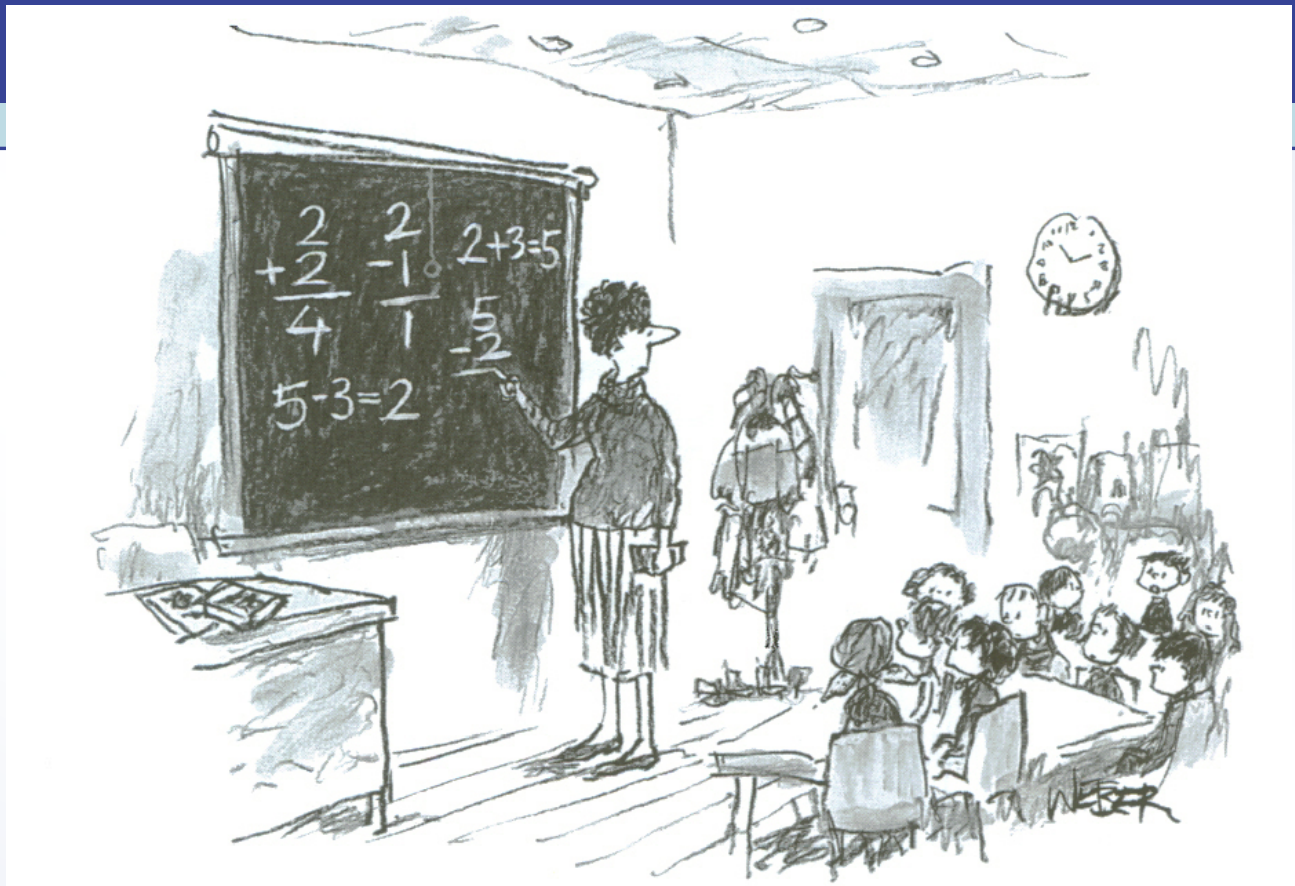
- Math — Subject
- Decimals — Topic
- **Page 152 in the book** — Assignment
- Going on a decimal hunt — Activity
- Read decimals and put them in order — Learning Target

Is it or is it not a learning target? Why or why not?

- I am learning to write an objective summary
- I am learning to dribble to keep the ball away from an opponent
- I am learning to review for a test
- I am learning to go on a decimal hunt
- I am learning to explain the difference between mitosis and meiosis
- I am learning to rank decimals from largest to smallest
- I am learning to organize my notebook

Is it or is it not a learning target? Why or why not?

- *I can write an objective summary* (Target)
- I can dribble to keep the ball away from an opponent (Target)
- I can review for a test (activity)
- I can explain the difference between mitosis and meiosis (Target)
- I can rank decimals from largest to smallest (Target)
- I can organize my notebook (activity)
- I can drive a car with skill (standard)



"Please, Ms. Sweeney, may I ask where you're going with all this?"

Would this be an appropriate target to share with students why or why not?

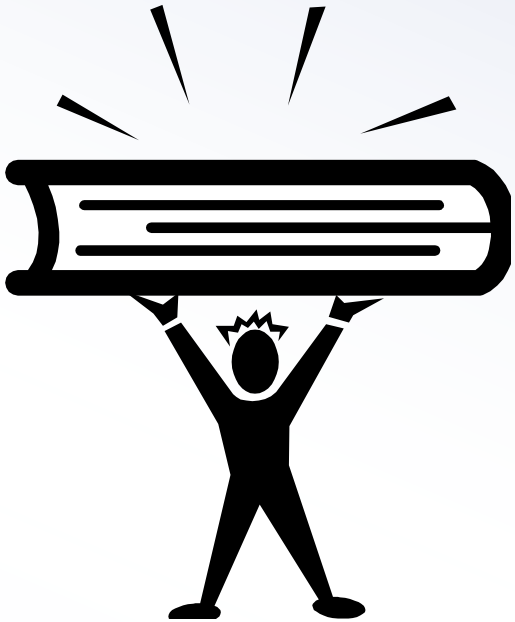
Formulate generalizations on how economic freedom improved the human condition, based on students' knowledge of the benefits of free enterprise in Europe's Commercial Revolution, the Industrial Revolution, and 20th Century free market economies, compared to communist command communities

Examples of Kinds of Targets

1. Knows that energy can be transformed between various forms: *Knowledge*
2. Formulates testable questions: *Reasoning*
3. Pronounces word correctly in Spanish: vowel/consonant sounds; diphthongs: *Skill*
4. Constructs a pictograph to represent information: *Product*

Knowledge Targets

Mastery of substantive subject content where mastery includes both knowing and understanding it.



Knowledge Examples

- Identify metaphors and similes
- Read and write quadratic equations
- Describe the function of a cell membrane
- Know the multiplication tables
- Explain the effects of an acid on a base

Making Targets Clear to Students

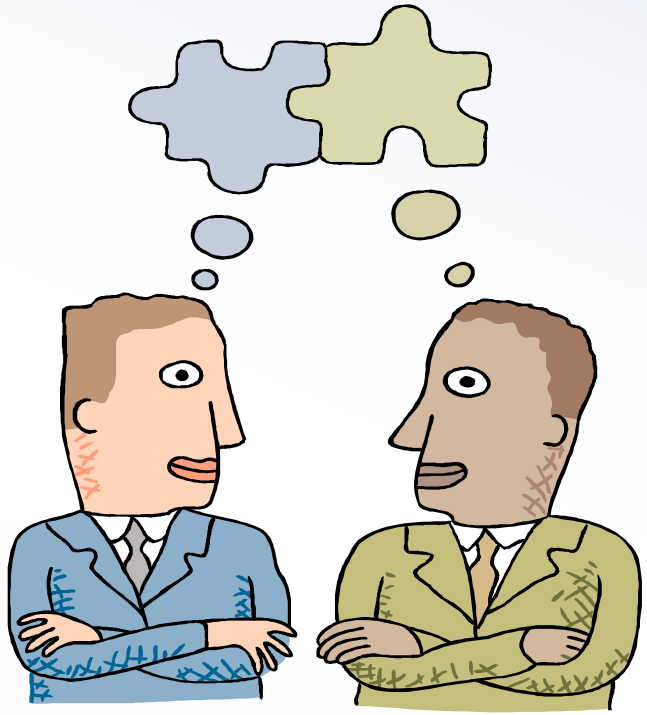
Often, Knowledge objectives can be shared as a learning target

(Knowledge)

- I am learning to…

Reasoning Targets

The ability to use knowledge and understanding to figure things out and to solve problems.



Reasoning Examples

- Use statistical methods to analyze, evaluate, and make decisions.
- Make a prediction based on evidence.
- Examine data/results and propose a meaningful interpretation.
- Distinguish between historical fact and opinion.

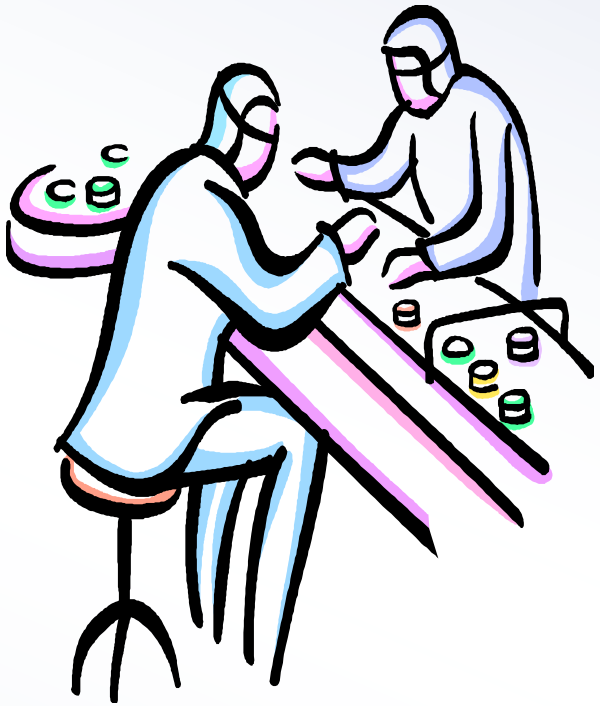
Making Targets Clear to Students

Share the learning target as is *(Knowledge)*

Convert the target into language students understand, then share it *(Reasoning)*

Performance/Skill Targets

The development of proficiency in doing something where the process is most important.



Performance/Skill Examples

- Measure mass in metric and SI units
- Use simple equipment and tools to gather data
- Read aloud with fluency and expression
- Participates in civic discussions with the aim of solving current problems
- Dribbles to keep the ball away from an opponent

Be Careful!!!

- If you are tempted to identify a standard as a skill target, remember:
  - "Skill" does not refer to *mental* skills.
  - With a skill target, a real-time *performance*, rather than a *product*, is the ultimate outcome.

Product Targets

The ability to create tangible products that meet certain standards of quality and present concrete evidence of academic proficiency.

Product Examples

- Construct a bar graph
- Develop a personal health-related fitness plan
- Construct a physical model of an object
- Write a term paper to support a thesis

Making the learning clear: I am learning to…

Often you can share the learning target as is ***(Knowledge)***

Convert the target into language students understand, then share it ***(Reasoning)***

Convert the language of your rubrics to student-friendly language, then introduce the concepts from the rubric ***(Reasoning, Performance Skill, Product)***

Standards Assessed with a Rubric

- **Discussion**
- **Mathematics problem solving & communication**
- **Presentation Skill**
- **Reading oral fluency**
- **Scientific argumentation**
- **Some reasoning skills: Infer**

KNOWLEDGE:	Retrieve what info?
REASONING:	Figure out what?
SKILLS:	Demonstrate what behavior?
PRODUCTS:	Create, build what?

Check for Understanding

1. Uses the inverse relationships of multiplication and division to build fact families
2. Formulates testable questions:
3. Pronounces word correctly in Spanish vowel/consonant sounds; diphthongs
4. Constructs a pictograph to represent information
5. Explains the concept of diversity
6. Knows how to measure cardio respiratory fitness

Check for Understanding

1. Uses the inverse relationships of multiplication and division to build fact families: R
2. Formulates testable questions: R
3. Pronounces word correctly in Spanish: vowel/consonant sounds; diphthongs: S
4. Constructs a pictograph to represent information: P
5. Explains the concept of diversity: K
6. Knows how to measure cardio respiratory fitness: K

Student Friendly Learning Targets

Four Types of Learning Targets:

- Knowledge
- Reasoning
- Skill
- Product

Would it be clear to the student what they are learning and doing?
Clear verses Fuzzy Learning Targets

- I am learning to write a good opening to a story.
- I am learning how to identify the front, back and title page of a book.
- I am learning to recognize strong thesis statements that are worth writing about.
- I am learning to infer.
- I am learning to write and objective summary.
- I am learning to explain ways seeds move from place to place.

As a students what questions do you have about the learning targets?
Clear verses Fuzzy

- I am learning to write a good opening to a story. (C)
- I am learning how to identify the front, back and title page of a book. (C)
- I am learning to recognize strong thesis statement that are worth writing about. (C)
- I am learning to infer. (F)
- I am learning to write and objective summary. (F)
- I am learning to explain ways seeds move from place to place. (C)

Sample Student-Friendly Targets

Key Ideas and Details

Learning Target: I am learning to comprehend literary nonfiction by identifying key ideas and details.

Success Criteria to support student understanding of the learning target.

This means:

- I am learning to determine the central idea of the text and cite evidence from it to support my thinking.
- I am learning to provide an objective summary of the text.
- I am learning to analyze how a text makes connections among and distinctions between individuals, ideas, or events.

Task: Examine the success criteria below, are they all clear as written?

-I am learning to determine the central idea of the text and cite evidence from it to support my thinking.

- I am learning to provide an objective summary of the text.
- I am learning to analyze how a text makes connections among and distinctions between individuals, ideas, or events.

Student Friendly with Success Criteria

Learning Target: I am learning to provide an objective summary of the text.

Success Criteria

This means I am learning to provide a recap of the original text that highlights the main points without unnecessary examples, descriptions, or digressions and contains only the facts not opinions.

1. Would you be able to assess a students ability and provide them feedback on this target?
2. How might you assess this target?
3. What learning experience might you provide to teach this target?

Student Friendly with Success Criteria

I am learning to provide an objective summary of the text.

This means I am learning to provide a recap of the original text that highlights the main points without unnecessary examples, descriptions, or digressions and contains only the facts not opinions.

Process for Converting Learning Targets to Student-friendly Language

1. Identify important or difficult learning goal.
2. Identify word(s) needing clarification.
3. Define the word(s).
4. Rewrite the definition as an “I am learning to” statement, in terms that your students will come to understand.
5. Try it out and refine as needed.
6. Have students try this process.

(Pearson, *Classroom Assessment for Student Learning*)

Let's see what Summarize looks like when it is put into a student friendly learning target.

SUMMARIZE

1. Dictionary Definition

2. Student Friendly…

I am learning to…

This means I will be able to…

Summarize text

SUMMARIZE

Dictionary Definition: to give a brief statement of the main points, main events, or important ideas

- Student-friendly learning target:
  - I am learning to summarize text.
  - This means I will be able to make a short statement of the main points or the big ideas of what I read.

Your Turn…

Choose either *infer* or *prediction* and convert it into student-friendly terms.

1. *Dictionary Definition:*

infer or prediction

2. *Student-friendly language:*

I am learning to…

This means…

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Make PREDICTION

PREDICTION

Dictionary Definition: A statement saying something will happen in the future

Student-friendly language:

- I am learning to make predictions.
- This means I will be able to use information from what I read to guess at what will happen next.

INFER

Infer Dictionary Definition:

A reasonable guess based on information.

Student Friendly:

I am learning to infer.

This means I can make a reasonable guess based on information.

INFER: Assign the following roles at your table:

- Teacher
- Luke
- Sarah
- Maria
- Jamal
- If you have more people at your table, assign one to be the narrator.
- Random people take the part of “students.”

Activity Directions:

- Read the scenario as readers' theater.

- When you finish, discuss these questions:
  - How did the teacher introduce the student-friendly definition of inference?
  - What role did the weak examples play in clarifying the target?

What makes learning targets ‘wrong’ or ‘weak’?

- It is wrong if there is a misunderstanding of the intent of the standard -which is why many “experts” are needed to ensure consistency in interpretation.
- The deconstruction would be considered weak if it lacks developmental continuity (ability to scaffold learning based on the developmental needs of the learners) or if it fails to adequately address the content/concept(s) in the standard.

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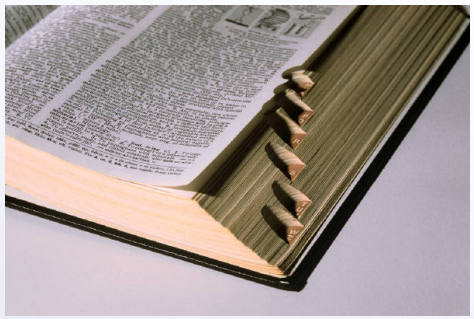
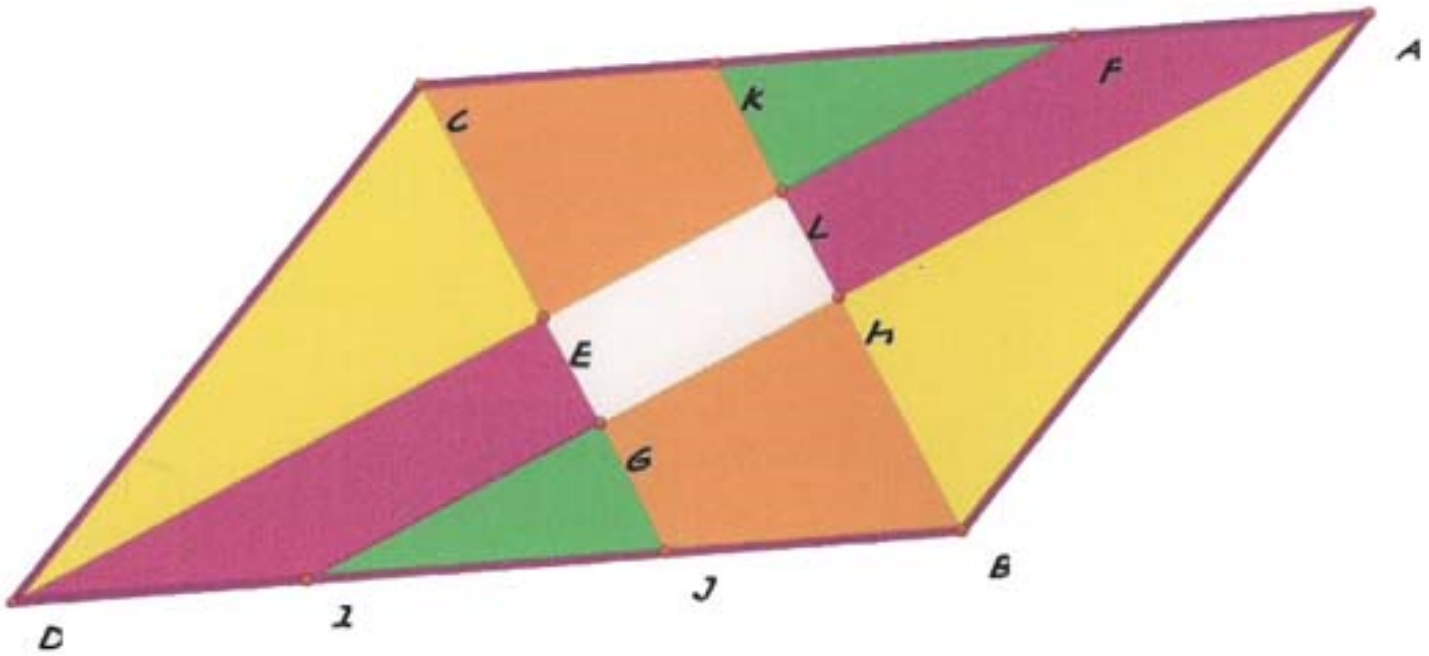
Con-gru-en-cy (kən-groo'-en-se) n. 1. Mathematics. a. coinciding exactly when superimposed: congruent triangles [*from Latin congrere,to meet together, agree.]*



Webster's Collegiate Dictionary, Tenth Edition

In a learning situation, the principle of congruency means to achieve an exact match or agreement between the standards, the learning targets, the instructional activity, and ultimately, the assessment(s).



Congruent or Not?

Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a/b* as the quantity formed by *a* parts of size 1/*b*.

- Recognize a unit fraction such as ¼ as the quantity formed when the whole is partitioned into 4 equal parts.
- Identify a fraction such as 2/3 and explain that the quantity formed is 2 equal parts of the whole partitioned into 3 equal parts (1/3 and 1/3 of the whole 3/3).
- Express a fraction as the number of unit fractions.
- Use accumulated unit fractions to represent numbers equal to, less than and greater than one (1/3 and 1/3 is 2/3; 1/3, 1/3, 1/3 and 1/3 is 4/3).

- Define unit fraction
- Define numerator and denominator
- Define congruent
- Label fractional parts of a pizza
- Add, subtract, multiply, and divide unit fractions
- Color requested fractional parts on drawings
- Create common denominators or numerators to compare fractions

Using the Template, Breakdown this Standard
What do students have to know and do?

Formulate generalizations on how economic freedom improved the human condition, based on students' knowledge of the benefits of free enterprise in Europe's Commercial Revolution, the Industrial Revolution, and 20th Century free market economies, compared to communist command communities

1. Overall what kind of a standards is this? K, R, S or P
2. Breakdown the Standard into the underlying targets.

Decisions:

1. How will you assess each target formatively, summative, or both?
2. What methods will you apply to assess student mastery of the target?

Partner 3

A lot has been shared about the key role that learning targets play in supporting learning.

What are two key take aways you have up to this point?

Share with your partner 3.

Practical techniques:
sharing learning intentions

- Explaining learning intentions derived from the standards at start of lesson/unit
  - Learning intentions
  - Success criteria
- Intentions/criteria in students' language
- Consensus and examples of key words to talk about learning
  - eg describe, explain, evaluate
- Planning/writing frames
- Annotated examples of different standards to 'flesh out' scoring rubrics (e.g. lab reports)
- Opportunities for students to design their own tests is a great way to review and provide mixed ability access to the learning.

Test Construction, Test Reflection, and Test Blueprint

Assessment Plan

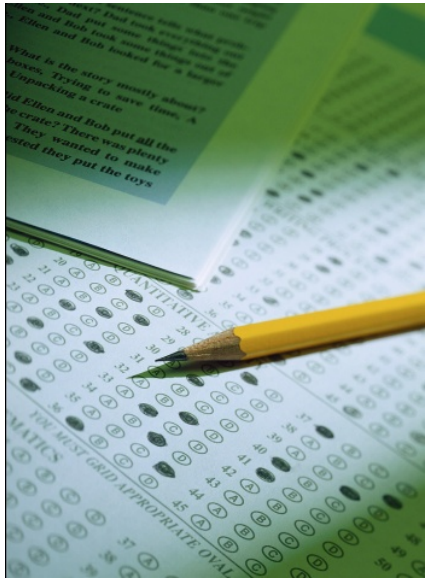
- An **ASSESSMENT PLAN** should **start** with the *desired results* (learning goals, standards) ***then*** the
- *Summative assessments* that are going to be used to determine whether the students 'knows and can do', ***next* should be the…**
- *Diagnostic assessment(s)* that are going to help to determine the what and the how for teaching and learning, ***then* should come the…**
- *Formative assessments* that are going to help students achieve the learning goals and that are going to cause the teacher to adjust teaching and learning activities.
  - Homework, quizzes ----------→ tests
  - Practices ----------→ performances
  - First draft, second draft ------→ product(s)

Steps in the Assessment Process

- What are your targets?
  - Deconstruct state standards into K, R, S, P
  - What is your plan on how you will share the targets with students: student friendly and what strategies will you use throughout the lesson to focus on the target?
- **Design the summative assessment.**
  - **Items should match back to learning targets**
  - **Develop a test plan**
- Create a diagnostic or pre-test.
  - Build in known student misconceptions
  - Give 2-3 days prior to starting unit
- Build in formative checks along the way
  - Examine learning plan and insert appropriate learning checks so that you will know that students will be successful on the summative assessment.

Four Assessment Methods

- Selected Response
  - Multiple Choice
  - True/False
  - Matching
  - Fill in or short answer
- Extended Written Response
- Performance Assessment
- Personal Communication
  - Questions
  - Conferences
  - Interviews



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Target x Method Match

111

Target X Method Match

	SR	EWR	PA	PC
KNOW				
REASON				
SKILLS				
PRODUCT				

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Target-Method Match

- Work with a partner.
- Focus on the first row, “Knowledge Targets.”
- For each assessment TYPE, determine if it is:
  - Strong: The method works for **all** learning targets of this type.
  - Good: The method works for **many** of the learning targets of this type.
  - Partial: The method works **in some instances** for learning targets of this type.
  - Poor: The method **never** works for learning targets of this type .

- Repeat for remaining target types.

(Pearson, *Classroom Assessment for Student Learning*)

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Target X Method Match

	SR	EWR	PA	PC
KNOW	G	S	Pt	S
REASON	G	S	Pt	S
SKILLS	Pt	Pr	S	Pt
PRODUCT	Pr	Pr	S	Pr

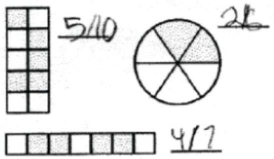
“Then, as you can see, we give them some multiple choice tests.”

Rules of Engagement

- These assessment methods are not interchangeable—they work differentially well with different kinds of learning targets
- None of the methods is inherently superior to the others
- Each method brings specific strengths and weaknesses

Name: *Claire* —4 Date: *Feb. 1, 2002*

1. Write a fraction to match the shaded part of each figure.



2. At the ocean, Erica found 19 shells to add to her collection of 25 shells. She also found 9 interesting rocks and decided to start a rock collection. How many shells does Erica have in her collection now?

19
+25
44

3. Fill in the boxes to complete the number pattern.

1	3	9	27
2	6	18	54
5	9 ✗ 15	45	90 ✗ 135

4. Fill in the missing numerals on the number lines.

106 A B 112 C D

A 108 B 110 C 114 D 116

A 75 78 81 B C

A 72 B 84 C 87

5. ✗

92,021
−18,943
74,088

73,078

6. Rewrite these numerals in order from least to greatest.

5,923 — 1. 5,899
7,056 — 2. 5,923
5,899 — 3. 7,048
7,048 — 4. 7,056

7. Write each numeral represented:

twenty-five thousand seven hundred eight
25,708

six thousand three hundred thirty
6,330

seventy thousand one
70,001

8. Write an addition sentence to go with this picture.

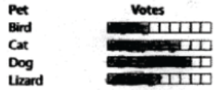
5+5+5

Now write a multiplication sentence to go with the picture.

5×3

9. The third grade classes at Ben's school voted on their favorite pets. Color in the graph to show their results. *Each box equals 3 votes.*

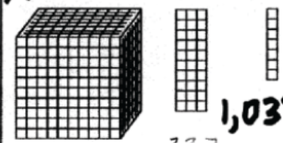
Results:
Bird: 12 Cat: 21
Dog: 24 Lizard: 18



10.

2,342
−1,845
497

11. ✗ What numeral is represented by the figures?



337

1,037

12. Thomas weighs 52 pounds. Jaime weighs less than Thomas. Which number of pounds could be the difference in their weights?

- O 62 pounds
- ● 7 pounds
- O 0 pounds
- O 56 pounds

13. A class of 24 students is having a party. How many liters of juice will they need?

- O 240
- ● 4
- O ½
- O ¼

14. What does each instrument measure?

A. Ruler *length*

B. Thermometer *temperature*

C. Scale: *weight*

D. Measuring cup *volume*

15. Draw the hour hand and the minute hand on the clock to show the time of 1:40.

Concept Learning Represented on Claire's Math

1. Fractions	2. Problem solving	3. Multiplication
4. Place Value	5. Number operations	6. Place value
7. Place value	8. Multiplication	9. Data organization
10. Number operations	11. Place value	12. Measurement
13. Measurement	14. Measurement	15. Measurement

Test Plan for 3rd grade Math Assessment/Claire's Math

Learning Target	Item #s	# of points
Writes fractions to match models	1	3
Solves problems with addition	2	1
Identifies number patterns with multiplication	3	5
Reads, writes, orders, and compares numbers to 10,000	4, 6, 7, 11	15
Subtracts whole numbers using regrouping	5, 10	2
Represents multiplication as repeated addition	8	2
Constructs bar graphs	9	4

Self-assessment with Selected Response Assignments

- Students use test plans as a basis for evaluation of strengths and areas of study.

- Students complete self-evaluation and goal-setting form on the basis of assignment, quiz, or test results.

What the Teacher Does (Elementary Version)

- **Identifies what learning target each test item represents.**

- **Fills out the first two columns of the form "Reviewing My Results."**

Reviewing My Results

Problem	Learning Target	Right?	Wrong?	Simple Mistake	Don't' get it
1.					
2.					
3.					

- **Students take quiz/test and hand it in**
- **Teacher corrects it and hands it back, along with the form, “Reviewing My Results”**
- **Then…**

The student…

1. Looks over the corrected test and marks on the form whether each problem is right or wrong.

2. Reviews the wrong problems and decides if the error was due to a simple mistake or to not knowing how to do the problem.

Reviewing My Results

Problem	Learning Target	Right?	Wrong?	Simple Mistake	Don't' get it
1.		X			
2.		X			
3.		X			

Then the student completes the form “Analyzing My Results” to determine:

Which learning targets s/he is good at

Which learning targets s/he is pretty good at, but which need a little review

Which learning targets s/he needs to keep focusing on

You Be George

- George, a third-grader, recorded his quiz results on page 15.
- Please imagine you are George. Find partner 4 and be George together.
- Using the information from page 15, complete the form on page 16.
- You will have to make a few things up.

Strategy #1

Provide Students with clear and understandable vision of the learning target.

Strategy

Ensure that all assignments and activities are directly congruent to the learning target these can be formative assessments as well and can serve as data for the student to know how they are progressing.

Data like these can serve as a study guide for students.

PC Unit 5: Exponential and Logarithmic Functions Name:_____

Learning Targets	Examples from notes	Assignment Examples	Questions on Test	Got It	Need Help

11 Excellent

Precal Unit 4: Polynomial and Rational Functions Name: [redacted]

	Learning Targets	Examples from notes	Assignment Examples	Questions on Test
10/28	4.1: I can divide polynomials by long division & synthetic division.	pg 248 10, 18, 24, 10, 14, 32	pg. 248 9-21 odd 31-35 odd 41-45 odd	#3
11/2	4.2: I can factor polynomials and find real zeros. I can use the rational zero theorem to factor a polynomial.	handout	pg 258 #13-17 odd 23-29 odd	#2
11/4	4.3: I can accurately sketch the graph of a polynomial	pg 269 (3-9) pg 272 (ex 5)	handout #2-4 challenge 1 & 2	#8
11/10	4.4: I can analyze graphs of rational functions	pg. 278 examples & handout	page 290 23, 33, 39, 45	#4
/14	4.5: I can perform operations with complex numbers	handout 10-44	page 300 #1, 3, 9, 13, 15, 23, 21, 29	#9
4	4.6: I can solve polynomials in	examples	page 313	

Handout
Pg. 7

Test Plan: Implicit Differentiation

Learning Target	Target Type	Number of Questions
I can use implicit differentiation to find the derivative of a function.	K	5
I can find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.	K	2
I can find the 2^{nd} derivative in terms of x and y using implicit differentiation.	K	2
I can find equations for the tangent and normal line to the graph at the indicated point.	R	1
I can find dy/dx using both implicit and explicit methods and evaluate at a given point.	R	1
Open Response: I can use implicit differentiation to find the derivative of a function. I can find a point P which the line tangent to the curve at P is horizontal.	R	1

Learning Target: I can find equations for the tangent line and normal line to the graph at the indicated point.

11. $x^2 + 4xy + y^2 = 13$ *at the point* $(2,1)$

12. Bonus: $x^2e^y + y^2e^x = 2e$ *at the point* $(1,1)$

Consider the curve given by $x^2 + 4y^2 = 7 + 3xy$.

(a) Show that $\frac{dy}{dx} = \frac{3y - 2x}{8y - 3x}$.

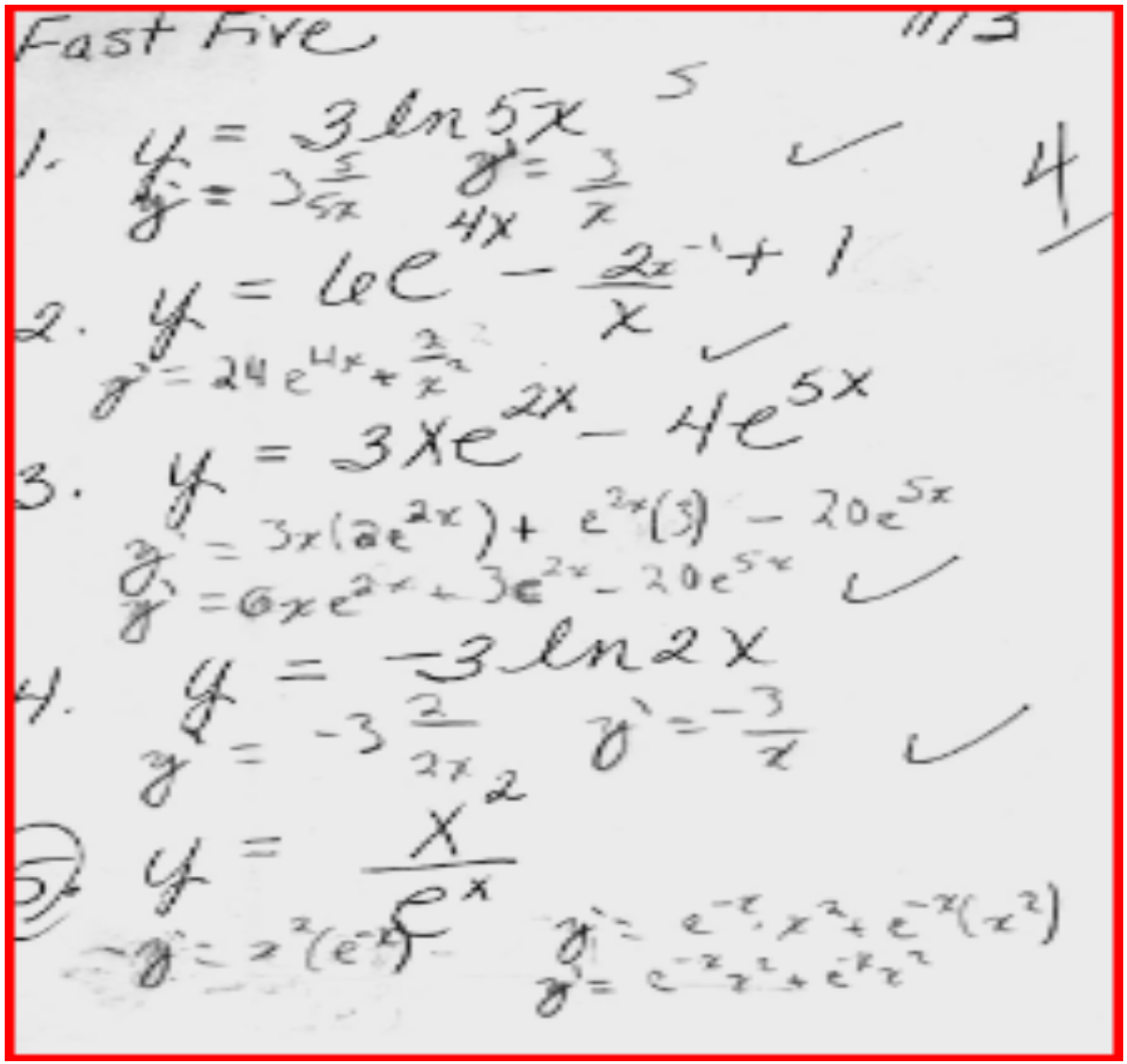
(b) Show that there is a point P with x-coordinate 3 at which the line tangent to the curve at P is horizontal. Find the y-coordinate of P.

Strategy #2

Use examples of strong and weak work.

Where Am I Now?

Pre-assessment Sample



Fast Five 11/3

1. $y = 3\ln 5x$ $y = 3\frac{5}{5x}$ $y' = \frac{3}{x}$ ✓ 4

2. $y = 6e^{4x} - \frac{2x^{-1}}{x} + 1$ ✓
$y' = 24e^{4x} + \frac{2}{x^2}$

3. $y = 3xe^{2x} - 4e^{5x}$
$y' = 3x(2e^{2x}) + e^{2x}(3) - 20e^{5x}$
$y' = 6xe^{2x} + 3e^{2x} - 20e^{5x}$ ✓

4. $y = -3\ln 2x$
$y' = -3\frac{2}{2x}$ $y' = \frac{-3}{x}$ ✓

5. $y = \frac{x^2}{e^x}$
$y' = x^2(e^{-x}) \quad y' = e^{-x} \cdot x^2 + e^{-x}(x^2)$
$y' = e^{-x}x^2 + e^{-x}x^2$

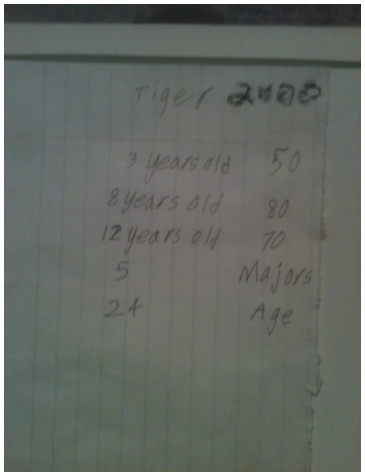
Chelsea

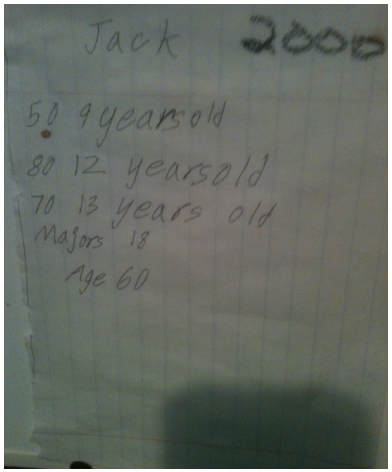
- “I love the way Mrs. McDaniel goes over homework. Helping me with the targets I don’t understand is far more important than copying for a good grade. How do you know that you know? That’s a great question.”

Strategy #4

Teach students to self-assess and set goals.

Nicklaus won 18 professional majors - twice as many as all but one other golfer. He finished second 19 more times, and third nine times. In all, Nicklaus posted 48 Top 3 finishes, 56 Top 5 finishes and 73 Top 10 finishes.





Date: 1-3-10

$y = \cos(2x)$ find eq of tan line at 2

$y' = -\sin 2x \cdot 2$

$y' = -2\sin 2x$

$y' = -2\sin(2 \cdot \pi/4)$

$y' = -2\sin(\pi/2)$

$\sin = y$

$y' = -2 \cdot 1 = -2$ $y = \cos(2 \cdot \pi/4)$

$(\pi/4, 0)$ $0 = -2 \cdot \pi/4 + b$

$y = mx + b$ $\pi/2 = b$

$y = -2x + \pi/2$

Date: 1-3-10

$y = x^2$ find eq of tan line at 2

$y' = 2x$

$m = 4$

$(2, 4)$ $4 = 4 \cdot 2 + b$

$-4 = b$

$y = 4x - 4$

Handout

Pg. 4

Date: 1-4-10

$f(x) = \sin(e^{-x})$

$f'(x) = \cos(e^{-x}) \cdot e^{-x} \cdot -1$

$f'(x) = -e^{x}\cos(e^{-x})$

Date: 1-5-10

$y = x + \cos x$ need point slope

$x = 0$

$y' = 1 - \sin x$

$y'(0) = 1 - \sin 0$

$y'(0) = 1$ so $m = 1$

$[0, 1]$ $1 = 1(0) + b$

$y = x + 1$ $1 = 0 + b$

$1 = b$

Date: 1-6-10

$v(t) = t^3 - 3t^2 + 12t + 4$

$a(t) = 3t^2 - 6t + 12$ [0,3]

C.V. $6t - 6 = 0$

$t = 1$

$a(0) = 12$

$a(1) = 9$

$a(3) = 21$ max accel. is 21.

Date: 1-18-10 where is inc?

$f(x) = x^4 + x^2 - 2$

$f'(x) = 4x^3 + 2x$ $(0, \infty)$

$2x(2x^2 + 1)$

$x = 0$ $2x^2 + 1 = 0$

C.V. = 0 $2x^2 = -1$

$x^2 = -\frac{1}{2}$

$(-\infty, 0)$ $(0, \infty)$

Test Pt. -1 0 1

Sign f'(x) − +

dec. inc.

min - (0, -2)

Date: 1-19-10

$f(x) = \tan(2x)$ $f'(x) = 2\sec^2(2x)$

$f'(x) = 2\sec^2(\pi/3)$

$f'(x) = 2(2)^2 = 8$

Date: 1-25-10

$y = \frac{1}{3}x^3 + 5x^2 + 24$

$y' = x^2 + 10x$

$x(x+10)$

$x = 0$ $x = -10$

$y'' = 2x + 10$

$x = -5$ P.O.I.

$(-\infty, -5)$ $(-5, \infty)$

Test Pt. -6 -5 -4

Sign f''(x) − +

down up

$f''(0) = 24$ + (0, 24)

$f''(-10) = 191$ (-10, 191)

P.O.I. $x = -5$

$-333 + 524$

524

-333

191

Date: 1-31-10

$f(x) = \ln(x + 4 + e^{-3x})$

$\frac{u'}{u}$ $\frac{1 + -3e^{-3x}}{x + 4 + e^{-3x}}$

$\frac{1 - 3 \cdot 1}{0 + 4 + 1} = -\frac{2}{5}$

Date: 2-2-10

$y = x^2 \sin 2x$

$x^2(\cos 2x) \cdot 2 + 2x(\sin 2x)$

$2x^2 \cos 2x + 2x \sin 2x$

$2x(x \cos 2x + \sin 2x)$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question

Find the average rate of change of the function over the given interval.

1) $f(x) = x^2 + 2x, \ [1, 7]$ 1) _____

A) $\frac{60}{7}$ B) 9 C) $\frac{21}{2}$ D) 10

2) $f(x) = 7 + \sin x, \ [-\pi, \pi]$ 2) _____

A) 0 B) $-\frac{2}{\pi} \approx -0.637$ C) $\frac{1}{\pi} \approx 0.318$ D) $\frac{7}{\pi} \approx 2.228$

Find the equation for the tangent to the curve at the given point.

3) $f(x) = \frac{7}{x} - 2 \ \text{at} \left(3, \frac{1}{3}\right)$ 3) _____

A) $y = -7x - 9$ B) $y = \frac{1}{2}x + \frac{1}{2}$ C) $y = -\frac{1}{4}x + 1$ D) $y = -\frac{7}{9}x + \frac{8}{3}$

Solve the problem.

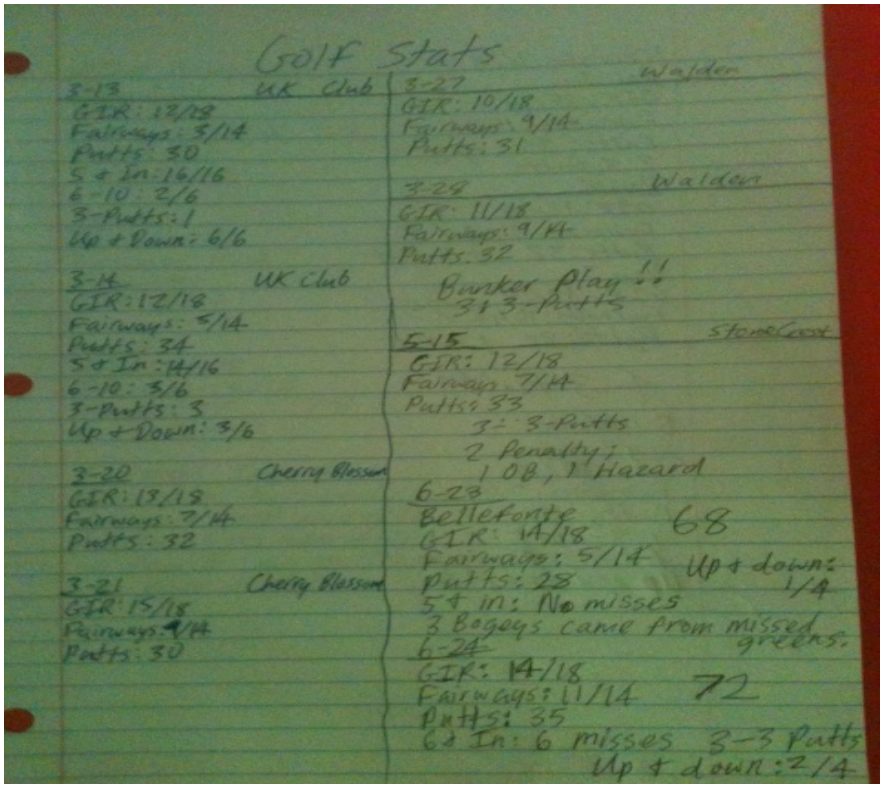
4) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec. Find the watermelon's average speed during the first 4 sec of fall and the speed at the instant $t = 4$ sec. 4) _____

A) 128 ft/sec; 65 ft/sec B) 64 ft/sec; 128 ft/sec

C) 65 ft/sec; 130 ft/sec D) 32 ft/sec; 64 ft/sec

Strategy #6

Teach students focused revision.



Test Reflections: Implicit Differentiation				
Learning Target	Question Numbers	Simple Mistakes	Guess	Misconceptions
I can use implicit differentiation to find the derivative of a function.	1 2 3 4 5			
I can find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.	6 7			
I can find the 2nd derivative in terms of x and y using implicit differentiation.	8 9 10			
I can find equations for the tangent and normal line to the graph at the indicated point.	11			
I can find dy/dx using both implicit and explicit methods and evaluate at a given point.	13 14			
Open Response: I can use implicit differentiation to find the derivative of a function. I can find a point P which the line tangent to the curve at P is horizontal.	14			

Test Reflections: Implicit Differentiation

Learning Target	Question Numbers	Simple Mistakes	Guess	Misconceptions
I can use implicit differentiation to find the derivative of a function.	1 2 3 4 5			
I can find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.	6 7	✓ ✓		
I can find the 2nd derivative in terms of x and y using implicit differentiation.	8 9 10			✓ ✓ ✓
I can find equations for the tangent and normal line to the graph at the indicated point.	11			
I can find dy/dx using both implicit and explicit methods and evaluate at a given point.	13 14		✓	✓
Open Response: I can use implicit differentiation to find the derivative of a function. I can find a point P which the line tangent to the curve at P is horizontal.	14	✓		

What I did	What I should have done	What I used to think... but now I know...

	What I did	What I should have done	What I used to think... but now I know...
$\frac{dy}{dx}$ at indicated points	(6) $10x - 14y\frac{dy}{dx} = 0$ $-14y\frac{dy}{dx} = -10x$ $\frac{dy}{dx} = \frac{-10x}{-14y}$ $\frac{dy}{dx} = \frac{-5}{7y}$ ... $= -\frac{15}{14}$ (7) $2x - 3y + 3x\frac{dy}{dx} + 2y = 0$ $3x\frac{dy}{dx} = -2x + 3y - 2y$ $\frac{dy}{dx} = \frac{-2x + y}{3x}$ ... $= -\frac{3}{5}$	(6) $10x - 14y\frac{dy}{dx} = 0$ $-14y\frac{dy}{dx} = -10x$ $\frac{dy}{dx} = \frac{-10x}{-14y}$ $\frac{dy}{dx} = \frac{5x}{7y}$, $\frac{dy}{dx}$ at $(3,2) = \frac{15}{14}$ (7) $2x - 3y + 3x\frac{dy}{dx} + 2y\frac{dy}{dx} = 0$ $3x\frac{dy}{dx} + 2y\frac{dy}{dx} = -2x + 3y$ $\frac{dy}{dx} = \frac{-2x + 3y}{3x + 2y}$ $\frac{dy}{dx} = \frac{-2(2) + 3(1)}{3(2) + 2(1)}$ $\frac{dy}{dx}$ at $(2,1) = \frac{-1}{8}$	(6) When finding $\frac{dy}{dx}$ my answer was $\frac{dy}{dx} = \frac{-10x}{-14y}$, upon simplification, I failed to cancel my negative sign, shown my answer. (7) When solving for $\frac{dy}{dx}$, I wrote $2y$ instead of $2y\frac{dy}{dx}$, which accordingly skewed my final answer for $\frac{dy}{dx}$. It was a simple mistake that resulted on a minor oversight
$\frac{d^2y}{dx^2}$	(8) $y^2 = 4x$ $2y\frac{dy}{dx} = 4$ $\frac{dy}{dx} = \frac{4}{2y}$ $\frac{dy}{dx} = \frac{2}{y}$ (9) $x^2 + y^2 = 49$ $2x + 2y\frac{dy}{dx} = 0$ $\frac{x}{y} = \frac{dy}{dx}$ (10) $3x^2 = 6y\frac{dy}{dx}$ $\frac{x^2}{3y} = \frac{dy}{dx}$	(8) $\frac{dy}{dx} = \frac{2}{y}$ $\frac{0(y) - 2\frac{dy}{dx}}{y^2}$ $\frac{-2\frac{dy}{dx}}{y^2}$ $\frac{-2(\frac{2}{y})}{y^2} = -\frac{4}{y^3}$ (9) $2x + 2y\frac{dy}{dx} = 0$ $\frac{-x}{y} = \frac{dy}{dx}$ $\frac{-1(y) - -x(\frac{dy}{dx})}{y^2}$ $\frac{-y + x(\frac{-x}{y})}{y^2}$ $\frac{-y - \frac{x^2}{y}}{y^2}$ $= \frac{-y^2 - x^2}{y^3}$ (10) $\frac{x^2}{2y} = \frac{dy}{dx}$ $\frac{2x(2y) - 2x^2\frac{dy}{dx}}{(2y)^2}$ $= \frac{4xy - 2x^2(\frac{x^2}{2y})}{2y^2}$ $= \frac{4xy - \frac{2x^4}{2y}}{2y^2}(2y)$ $= \frac{8xy^2 - 2x^4}{y^3}$	(8)(9)(10) Before this test, I had worked (1) $\frac{dy}{dx}$ problem. When studying and making up from my absence, I failed to properly prepare myself at finding 2nd derivatives. Upon self-study outside of class, I am more proficient at finding $\frac{d^2y}{dx^2}$ (9) On this problem I also said $\frac{dy}{dx} = \frac{x}{y}$ and not $\frac{-x}{y}$. This was because, while trying to skip steps in my head, I failed to subtract x, making it negative. It was a simple mistake (10) On this problem, I started $\frac{dy}{dx} = \frac{x^2}{3y}$ and not $\frac{x^2}{2y}$, this was a simple division error.
	(13) $\frac{dy}{dx} = \frac{-2x}{2y}$ $\frac{dy}{dx} = -3/2$ $y = \frac{12}{2x}$ $y = 12(2x^{-1})$ $y' = 12(2x^{-2})$ $y' = 3/2$	$\frac{dy}{dx} = \frac{-2x}{2y} = \frac{-x}{y} = -3/2$ $y = \frac{12}{2x} = \frac{6}{x}$ $y' = -\frac{6}{x^2} = -3/2$	(13) On this problem, my major error came from simplifying errors. I failed to simplify $\frac{-2x}{2y}$ into $\frac{-x}{y}$ and $\frac{12}{2x}$ into $\frac{6}{x}$ while incorporating my points into the unsimplified versions, my answer was skewed
	Open Response: $\frac{3y - 6}{8y - 9} = 0$ and stopped	$3y - 6 = 0$ $y = 2$ $(3)^2 + 4(2)^2 = 7 + 3(2)$ $25 = 25$	(OR) What I did was leave out the finishing step. It was a simple mistake, so upon reflection I made sure I realized to show (3, 2) on the curve

Learning Target	Question Numbers	Simple Mistakes	Guess	Misconceptions
I can use implicit differentiation to find the derivative of a function.	1 2 3 4 5	3, 5		
I can find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.	6 7			
I can find the 2nd derivative in terms of x and y using implicit differentiation.	8 9 10	8		
I can find equations for the tangent and normal line to the graph at the indicated point.	11			
I can find dy/dx using both implicit and explicit methods and evaluate at a given point.	13 14			
Open Response: I can use implicit differentiation to find the derivative of a function. I can find a point P which the line tangent to the curve at P is horizontal.	14			

What I did	What I should have done	What I used to think... but now I know...
3) $2x+6x\frac{dy}{dx}+6y+2y\frac{dy}{dx}=0$ $\frac{dy}{dx}(6x+2y)=-2x+6y$ $\frac{dy}{dx}=\frac{-2x+6y}{6x+2y}$	3) $2x+6x\frac{dy}{dx}+6y+2y\frac{dy}{dx}=0$ $\frac{dy}{dx}(6x+2y)=-2x-6y$ $\frac{dy}{dx}=\frac{-2x-6y}{6x+2y}$	3.) minor lapse of thought. I left out a negative sign.
5.) $\frac{1}{2\sqrt{x}}-\frac{1}{2\sqrt{y}}\frac{dy}{dx}=0$ $\frac{dy}{dx}=\frac{\sqrt{x}}{\sqrt{y}}$	5.) $\frac{1}{2\sqrt{x}}-\frac{1}{2\sqrt{y}}\frac{dy}{dx}=0$ $-2\sqrt{y}\ -\frac{1}{2\sqrt{y}}\frac{dy}{dx}=-\frac{1}{2\sqrt{x}}\ \cdot 2\sqrt{y}$ $\frac{dy}{dx}=\frac{2\sqrt{y}}{2\sqrt{x}}=\frac{\sqrt{y}}{\sqrt{x}}$	5.) Mental math mistake.
8.) $\frac{dy}{dx}=\frac{2}{y}$ Derivative $\frac{d^2y}{dx^2}=\frac{y\cdot 0-0\cdot\frac{2}{y}}{y^2}=0$	8.) $\frac{dy}{dx}=\frac{2}{y}$ $\frac{d^2y}{dx^2}=\frac{y\cdot 0-2\frac{2}{y}\cdot y}{y^2}\cdot y$ $\frac{d^2y}{dx^2}=\frac{-4}{y^3}$	8.) I messed up on the quotient rule I did this for some reason: $\frac{d}{dx}\left[\frac{u}{v}\right]=\frac{v\cdot u'-u'\cdot v'}{v^2}$ wait happen again

Practice Quiz Reflections

Learning Target	Question #	Confident	Simple Mistake	Just Guessed	Strategy to Improve for Test
I can solve quadratic equations by factoring	1 and 2	# 1	I tried to overcomplicate the problem by dividing by 8.	# 2	Find what is a multiple of 8 & then find the roots.
I can solve quadratic equations by extracting the square roots (isolating the square)	3 and 4	# 3, 4			
I can solve quadratic equations by the quadratic formula	5 and 6	#5, 6			
I can solve quadratic equations by graphing	7			#7 - Didn't know how to use calc.	Learn to graph on the calculator
I can solve quadratic equations using the method of my choice. What is your favorite method?	8			#8	Can cross multiply, to turn into a quadratic & then polynomial.
I can apply quadratic equations in the real world.	9, 10, 11		[illegible]	# 9, 10, 11	
I can solve quadratic equations with complex zeros.	20	# 20			
I can add or subtract complex numbers.	12 and 13	# 12, 13			
I can multiply complex numbers.	14,15,16, 17, and 18	# 14, 15, 16, 17, 18			
I can divide complex numbers	19	# 19			

Summative Feedback

- Before using targets: **score 65%**
  - Student knows what questions they got right/wrong
  - Kept the score and went on, maybe reviewed, but still went on
  - No diagnosis of problems and ways to address them – perhaps taking a test again but no plan as to what to focus on
  - No idea on student or teacher's part of strengths and weaknesses

~~Summative~~ Formative Feedback

- **After using targets**: **score 65%**
  - Get results broken out by target
  - Students know what they do well and what they need to work on
  - Students have opportunities to work on identified targets and gain understanding before trying again to show mastery
  - Diagnostic tool to show strengths and weaknesses by student and class

Re-testing

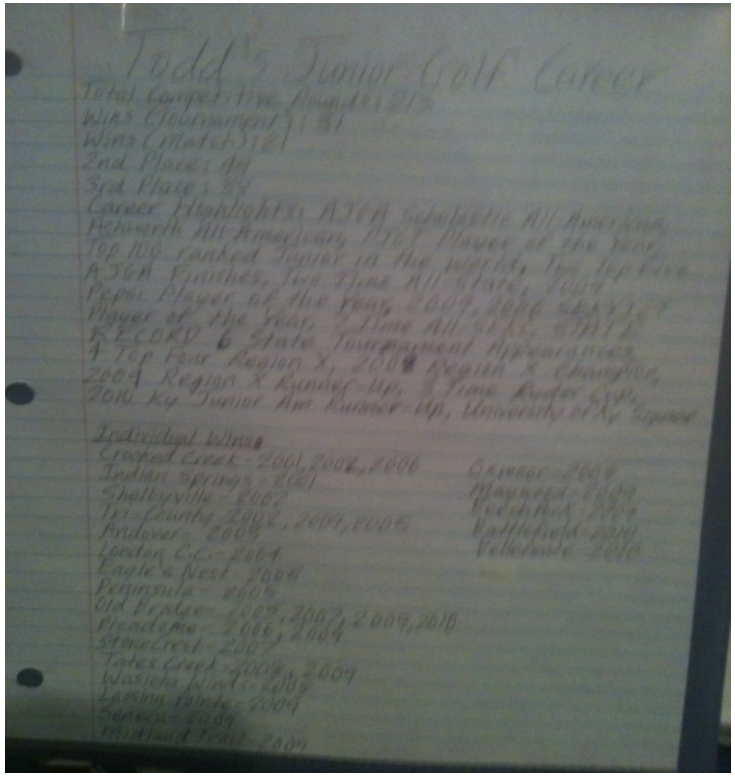
- Students have received assessment results by target
- Identify targets needing improvement
- KEY before a retest: Work on target practice in preparation for re-testing
- Re-test only over identified targets **– students love this!!!**
- Evaluate results, rinse, and repeat!

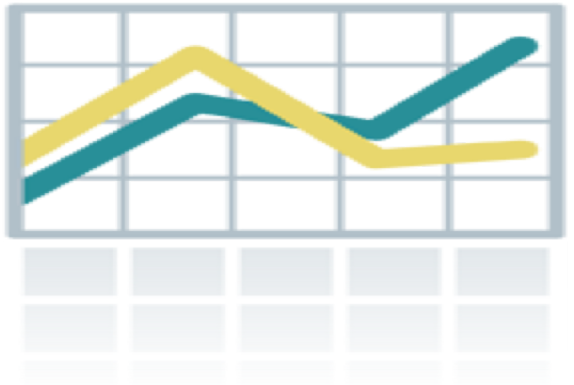
Jake

- “Test corrections are an excellent learning tool. Students can now learn from the simple or complex mistakes made instead of repeating them.”

Strategy #7

Engage students in self-reflection, and let them keep track of and share their learning.





Identifying My Strengths and Areas for Improvement

Calculus – Chapter 5 **Name:**_____

Please look at your corrected assessment and mark whether your response to each problem is right or wrong. Then look at the responses that are incorrect and decide if you made a simple mistake. If you did, mark the "Simple mistake" column. For all the remaining problems that are incorrect, mark the "More study" column. Please explain in the "What I should have done" column.

Problem	Learning Target	Right?	Wrong?	Simple Mistake?	What I should have done.	More Study
1	I can find areas under a curve using the rectangular approximation method.					
2	I can use RAM to solve applications involving approximations of distances and areas.					
3	I can define a definite integral as a Riemann Sum.					
4	I can use area to evaluate a definite integral.					
5	I can use area to evaluate a definite integral.					
6	I can evaluate integrals using my graphing calculator.					
7	I can evaluate integrals using my graphing calculator.					
8	I can apply the properties of definite integrals.					

Identifying My Strengths and Areas for Improvement

Calculus – Chapter 5 **Name** [redacted]

Please look at your corrected assessment and mark whether your response to each problem is right or wrong. Then look at the responses that are incorrect and decide if you made a simple mistake. If you did, mark the "Simple mistake" column. For all the remaining problems that are incorrect, mark the "More study" column. Please explain in the "What I should have done" column.

Problem	Learning Target	Right?	Wrong?	Simple Mistake?	What I should have done.	More Study
1	I can find areas under a curve using the rectangular approximation method.	✓				
2	I can use RAM to solve applications involving approximations of distances and areas.	✓				
3	I can define a definite integral as a Riemann Sum.	✓				
4	I can use area to evaluate a definite integral.	✓				
5	I can use area to evaluate a definite integral.	✓				
6	I can evaluate integrals using my graphing calculator.	✓				
7	I can evaluate integrals using my graphing calculator.	✓				
8	I can apply the properties of definite integrals.	✓				
9	I can find the average value of a function.		✗	✓	Don't the average formula instead of area	
10	I can approximate definite integrals & find areas under curves using Simpson's rule.	✓				
11	I can approximate definite integrals & find areas under curves using a trapezoidal approximation.	✓				
12	I can use area to evaluate a definite integral.	✓				
13	I can define a definite integral as a Riemann Sum.	✓				
14	I can evaluate integrals using my graphing calculator.	✓			don't understand the lesson	
15	I can approximate definite integrals & find areas under curves using a trapezoidal approximation.		✗			✓
16	I can apply the Mean Value Theorem for Definite Integrals		✗		used average value formula –	✓

Derrick

"I am able to prove myself and show that I can do well in math… maybe not the first time… but definitely the 2nd."

Reflection
Road Blocks to Light-bulbs

Madison

"Math was never my best subject. I stress over tests in math. After using learning targets and analyzing the things I get and the things I don't, my stress level went down. Now I feel successful in math!"

Self-Reflection by the Student Using Target Tracking Sheets

I have become better at _____. I used to

_____, but now I _____.

Strategy

One an assessment next to each item:

_____confident _____Unsure _____Guessed

Strategy: Transparency of Targets

List the target above the assessment items so that students see it is not an *I Got You Game* but is supportive of learning.

Provide students with a way to track their progress target by target.

Developing an Accurate and Valid Assessment Blueprint

1.Determine the **PURPOSE** of the assessment you are designing.
2.Determine the relative importance/weight **each target** (not item) should have. In other words, decide which is most important to least important in terms of this assessment. Indicate that using points or percentages in the last column—this can be adjusted at the end, too, if needed.
3.Remembering the 'target-method match' activity, begin to select and/or design items for each target on your assessment.

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Test Blueprint (and Instructional) Design Considerations

- Are the targets aligned to the standard?
- Do the learning targets represent what has been or will be taught?
- Does the relative importance of each learning target match its relative importance during instruction?
- Is the sample size large enough to inform judgments about mastery of a target?
- Have appropriate assessment methods been selected based on the target types?
- **Is there enough information to design an assessment that would yield accurate results about student understanding?**

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Test Plan: Implicit Differentiation

Learning Target	Target Type	Number of Questions
I can use implicit differentiation to find the derivative of a function.	K	5
I can find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.	K	2
I can find the 2^{nd} derivative in terms of x and y using implicit differentiation.	K	2
I can find equations for the tangent and normal line to the graph at the indicated point.	R	1
I can find dy/dx using both implicit and explicit methods and evaluate at a given point.	R	1
Open Response: I can use implicit differentiation to find the derivative of a function. I can find a point P which the line tangent to the curve at P is horizontal.	R	1

Creating or selecting a test without having a test plan can result in mismatches between instruction

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The BIG Questions:

- Are all of the nec… targets for y… represe… …am?
- Ar… …epresented …presented?

Test Blueprints help with the answers!

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Five “key strategies”…

- Clarifying, understanding, and sharing learning intentions
  - curriculum philosophy
- Engineering effective classroom discussions, tasks and activities that elicit evidence of learning
  - classroom discourse, interactive whole-class teaching
- Providing feedback that moves learners forward
  - feedback
- Activating students as learning resources for one another
  - collaborative learning, reciprocal teaching, peer-assessment
- Activating students as owners of their own learning
  - metacognition, motivation, interest, attribution, self-assessment

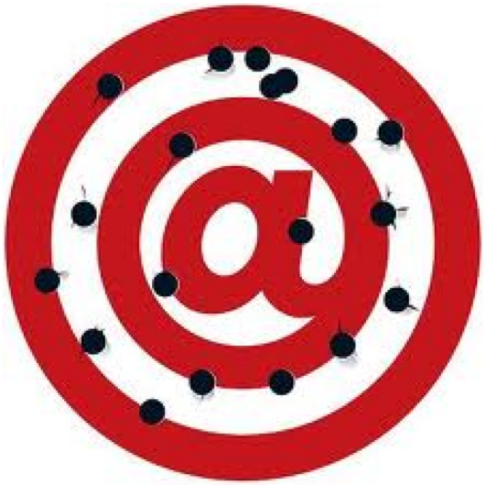
(Wiliam & Thompson, 2007)

Practical techniques:
eliciting evidence

- Key idea: questioning should
  - cause thinking on part of student(s)
  - provide data that informs teaching
- Improving teacher questioning
  - generating questions with colleagues
  - closed v open
  - low-order v high-order
  - appropriate wait-time
- Getting away from I-R-E
  - basketball rather than serial table-tennis
  - ‘No hands up’ (except to ask a question)
  - ‘Hot Seat’ questioning
- All-student response systems
  - Class polls, ABCD cards, Mini white-boards, Exit passes

Practical techniques: feedback

- Key idea: feedback should
  - cause thinking
  - provide guidance on how to improve
- Comment-only
- Focused grading
- Explicit reference to rubrics
- Suggestions on how to improve
  - Not giving complete solutions
- Re-timing assessment
  - (eg three-fourths-of-the-way-through-a-unit test)



Students owning their learning and as learning resources

- Students assessing their own/peers' work
  - With rubrics
  - With exemplars
  - "Two stars and a wish"
- Training students to pose questions/identifying group weaknesses
- Self-assessment of understanding
  - Traffic lights
  - Red/green discs
  - Colored cups
- End-of-lesson students' review

The Evidence

Learning Targets

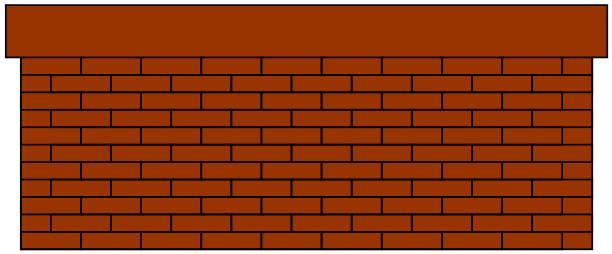
Without Clear Targets We Can't Do Any of the Following…

Stand and make eye contact with a person not at your table. Have a 2 minute discussion around the statement above. Write down as many things as the two of you can come up with.

Without Clear Targets We Can't Do Any of the Following…

- Know if the assessment adequately covers and samples what we taught.
- Correctly identify what students know and don't know and their level of achievement.
- Plan next steps in instruction.
- Be good consumers of instructional materials or lessons that will support student attainment of the standard.
- Give detailed, descriptive feedback to students.
- Have students self-assess or set goals likely to help them learn more.
- Keep track of student learning target by target or standard by standard.
- Complete a standards-based report card.

The single most common barrier to sound classroom assessment is the teachers' lack of vision of appropriate achievement targets within the subjects they are supposed to teach.



Rick Stiggins

"There is no more foundational activity for a school leader than making sure that there are clear learning targets aligned to whatever standards are in place in the school or district, that teachers understand them and teach to them, and that students understand them and reach for them."

Connie Moss and Susan Brookhart, "Leveling the Playing Field: Sharing Learning Targets and Criteria for Success"

Take Home Message

- Each target should clearly align to and support attainment of the standard.
- Each should be clear to the teacher (and to the students) and focused on what is to be LEARNED – NOT the activity.
- In looking at the 'set' of deconstructed targets for the standard collectively, others with expertise in the same content area should generally agree that the overall intent of the standard is met and that the targets would, in fact, scaffold the learner toward mastery/attainment of the overall standard.

What is the value of engaging in the deconstructing process?

The Evidence

If teachers were engaging students in the learning and assessment process so that students understood expectations and were able to monitor their own learning, what would you see and hear in the classroom?

Classroom Evidence of Engaging Students in Learning and the Assessment Process

- Standards converted into clear learning goals and targets.
- Learning targets that describe what students need to know, understand, and do—and how they will be assessed.
- Learning targets posted for students to see and reference throughout the lesson.
- Students discussing the learning targets and using them to assess their learning throughout the lesson.
- Students identifying the criteria that define excellence.
- Students assessing what they need to know, understand, and be able to do to achieve their learning goals.
- Specific feedback tools used to help students to reflect on their progress and what they can do to improve their performance.

What is it that we need to know and be able to do:

What will I be able to do when I've finished this lesson?

Utilize the formative assessment process to support student learning.

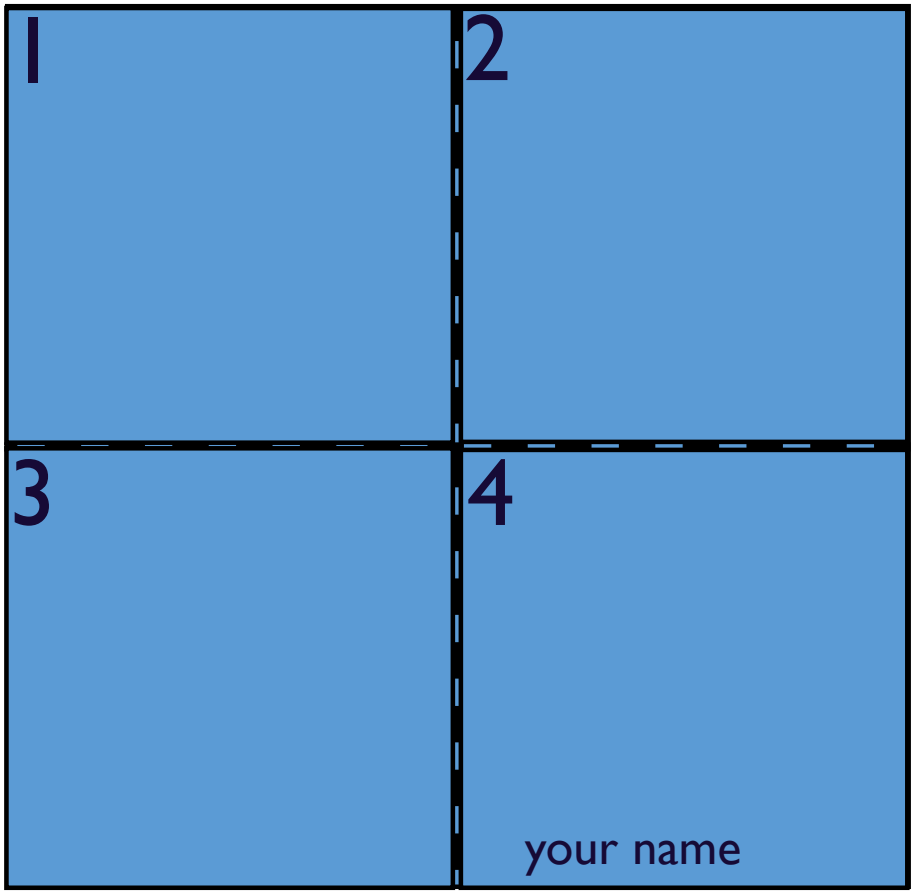
What do I need to learn so I can hit this target?

- Why the formative assessment *process is one of the most* powerful set of practices a teacher can implement?
- What is the relationship between formative assessment and student motivation?
- Five high yield practices and strategies to support implementation of the formative assessment process in the classroom.

What will I do to show that I understand the target?

Develop a personal action plan to apply the formative assessment process and strategies to support learning.

- Fold your paper in half both directions.
- Number the sections.
- Put your name on the bottom of section 4.
- Tear the sections apart on the fold lines.



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Tear 'n Share

Four questions will be displayed on the next screen. Individually, respond to each question on the section of paper whose number corresponds to the number of the question.

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Tear 'n Share

1. What is the most important thing you took away from today about formative assessment?

2. How will you apply your new learning to your work in the school or district? Be as specific as possible

3. Why the formative assessment *process is one of the most* powerful set of practices a teacher can implement?

4. What is the relationship between formative assessment and student motivation?

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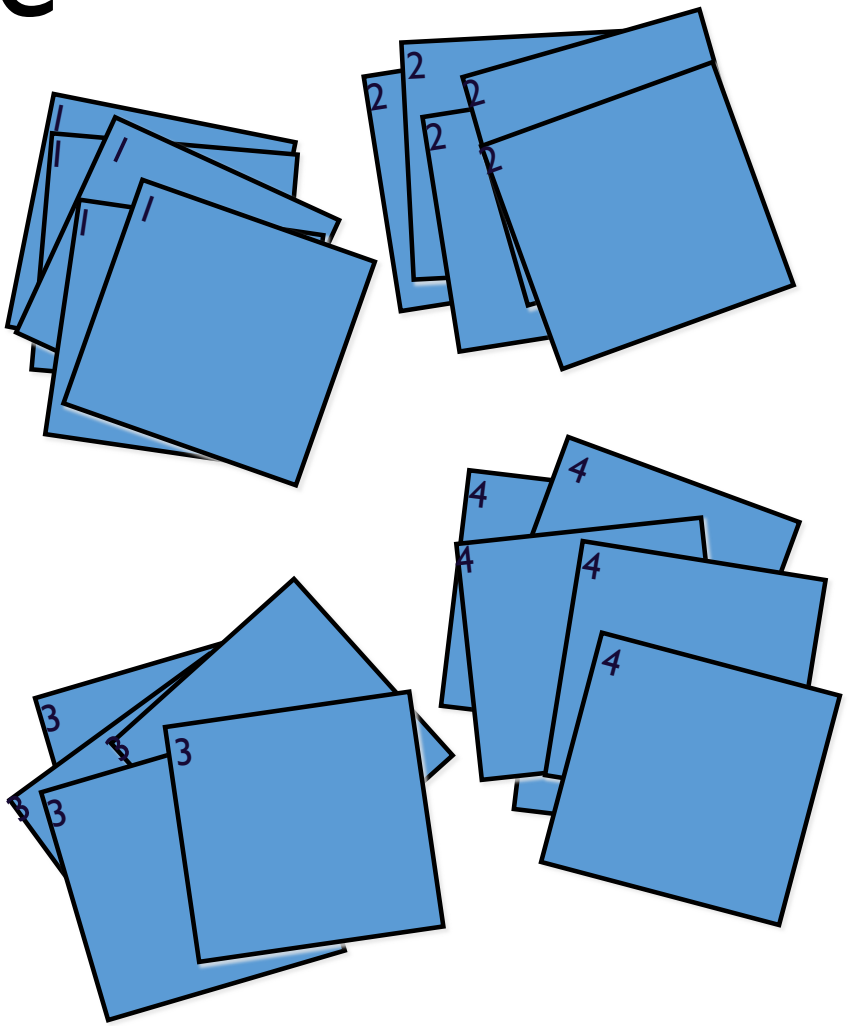
Tear ‘n Share

- Number off 1-4.
- Give all 1s to 1; 2s to 2; 3s to 3; 4s to 4.
- Individuals summarize/ categorize responses.
- Form number-alike groups and chart summaries.
- Select a person to share whole group.



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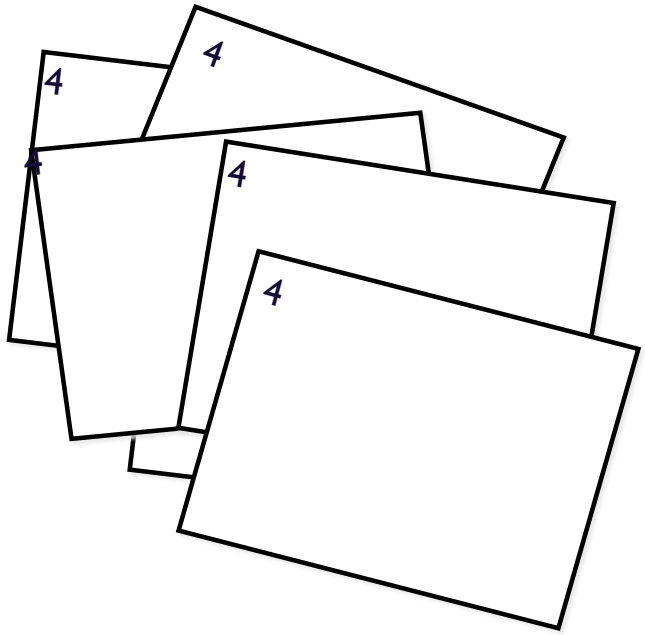
Tear 'n Share

- 4s: return your sections to the people who authored them.



- Take these with you as a reminder of your own goals for personal growth!

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I ORCHESTRATE LEARNING

I ENGAGE MINDS

I LISTEN TO QUESTIONS

I ENCOURAGE RISK

I SUPPORT STRUGGLE

I CULTIVATE DREAMS

I LEARN EVERYDAY

I TEACH

Google images
Pinterest

In Closing…
in the words of Haim Ginott

I have come to a frightening conclusion…

I am the decisive element in the classroom.

It is my personal approach that creates the climate. It is my daily mood that makes the weather.

As a teacher I possess tremendous power to make a child's life miserable or JOYOUS. I can be a tool of torture or an instrument of inspiration. I can humiliate or humor, hurt or heal.

In all situations it is my response that decides whether a crisis will be escalated or de-escalated, and a child humanized or de-humanized.

-Haim Ginott

Clinical psychologist, child therapist, parent, educator, teacher, and author

Reflection and Thank you…

Please complete the evaluation of this session.

Thank you for your time, flexibility, and sharing your expertise today.

For more information contact

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