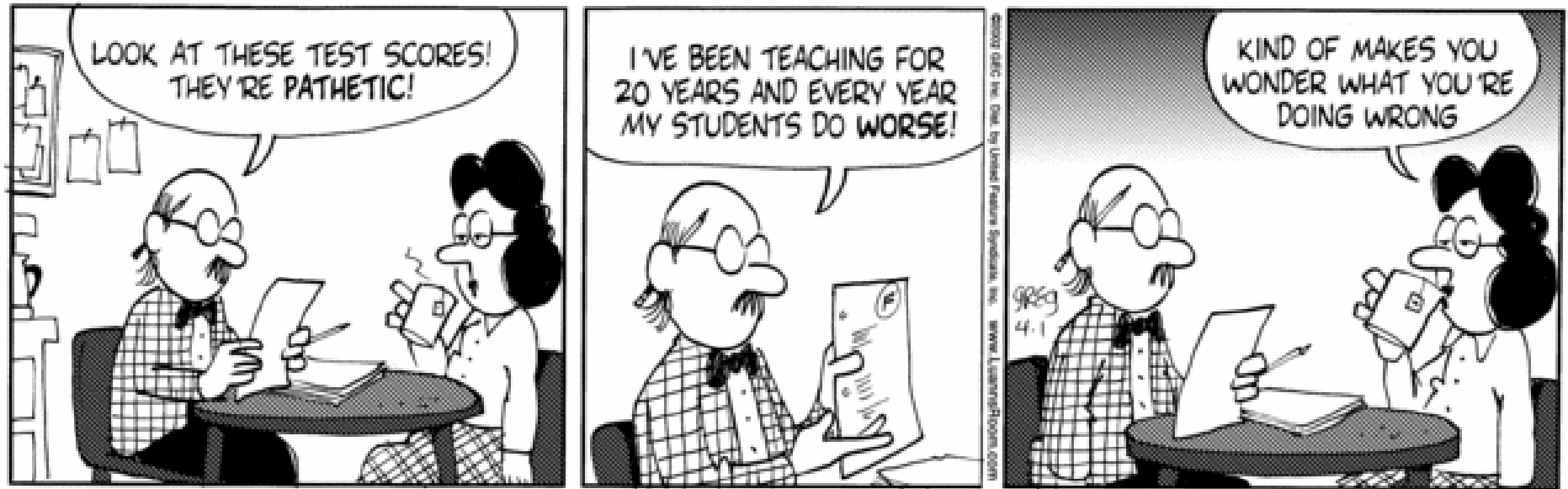


# Using Formative Data to Measure Growth and Inform Instruction and Learning

*Leslie Noonan  
Debra Synatschk*



# What do we mean by Formative Data?



# Rationale

- o To be a successful 21st century school, assessments\* must provide accountability, formative data to inform instructional decisions, longitudinal data to measure growth, and ways to evaluate students through performance-based learning.

\* *and instruction*

# Objectives

- o Identify the attributes of effective feedback
- o Generate ideas to apply Feed-up, Checking for Understanding, Feed-back, and Feed-forward
- o Apply principles of descriptive feedback
- o Recognize the role of students in self-evaluation

## Definition of Formative Assessment as agreed upon by a consortium of the CCSSO

“A process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students’ achievement of intended instructional outcome.”

W. James Popham. Transformative Assessment. 2008, p. 5



# Why Assessment *for* Learning Works

When students are required to think about their own learning, articulate what they understand, and what they still need to learn, achievement improves.

Black and Wiliam, 1998; Sternberg, 1996; Young, 2000

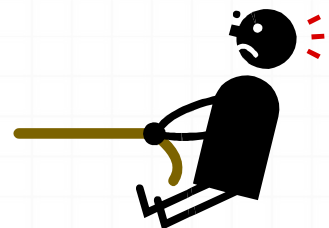


# Why Assessment *for* Learning Works

*Struggle – do not eliminate all struggle for students...*

## o Productive:

- o Grapple with information and develop solutions for themselves
- o Develops resilience and persistence
- o Aids in refining their own strategies
- o Learning goals are clear and achievable



## o Destructive:

- o Cannot see how difficulty or confusion will lead to beneficial learning outcome
- o Goals appear unclear, impossible
- o Intervene immediately if struggle leads to frustration and yields no benefit

# Five Attributes of Effective Formative Assessment- Developed by CCSSO

1. Learning Progression
2. Learning Goals and Criteria for Success
3. Descriptive Feedback
4. Self and Peer Assessment
5. Collaboration

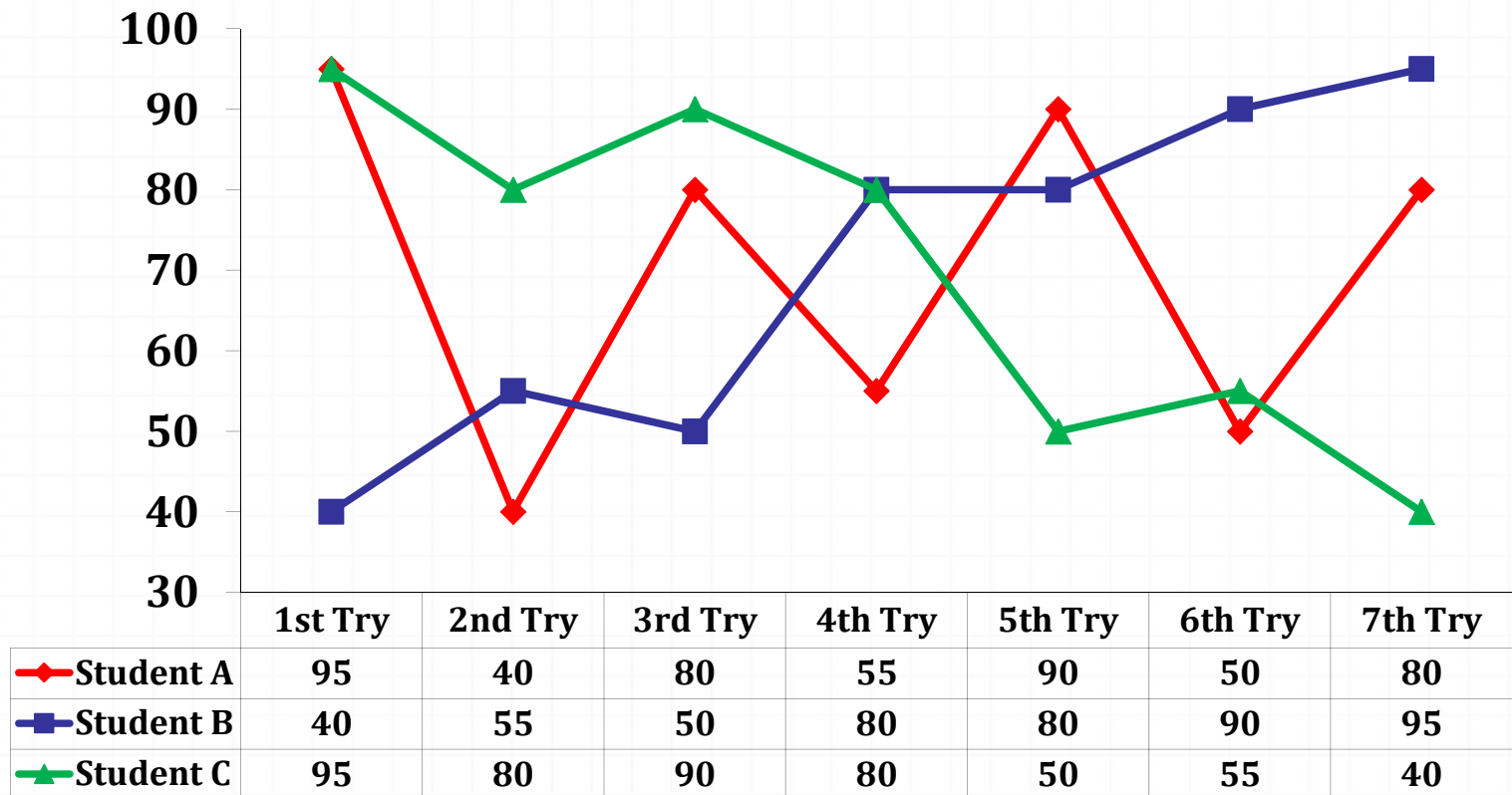


# Framework for Formative Data

1. Feed Up: Where am I going?
2. Checking for Understanding: Where am I now?
3. Feedback: How am I doing?
4. Feed-Forward: Where am I going next?

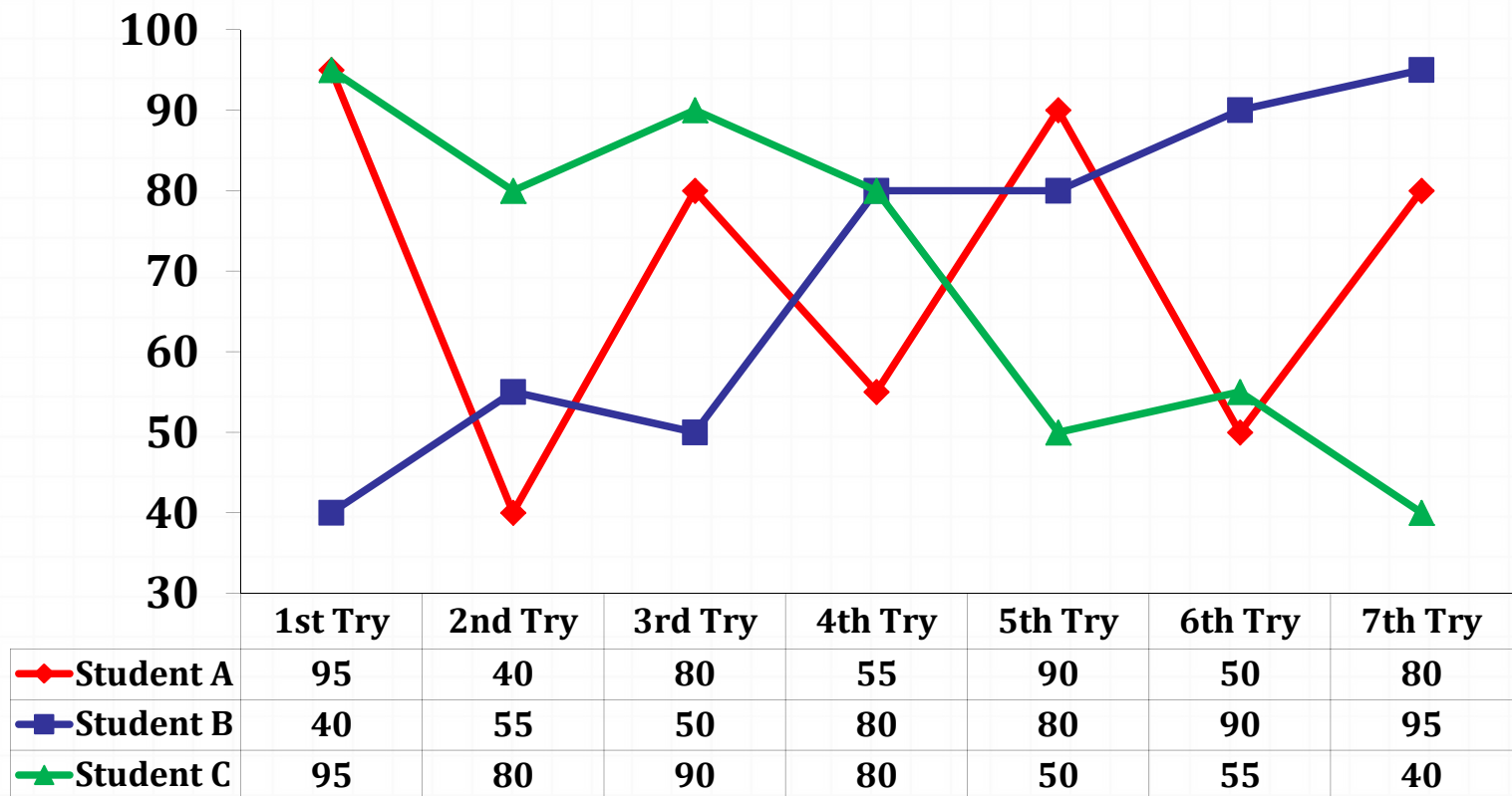
*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*

Which student would **you** choose to pack your parachute – and why?



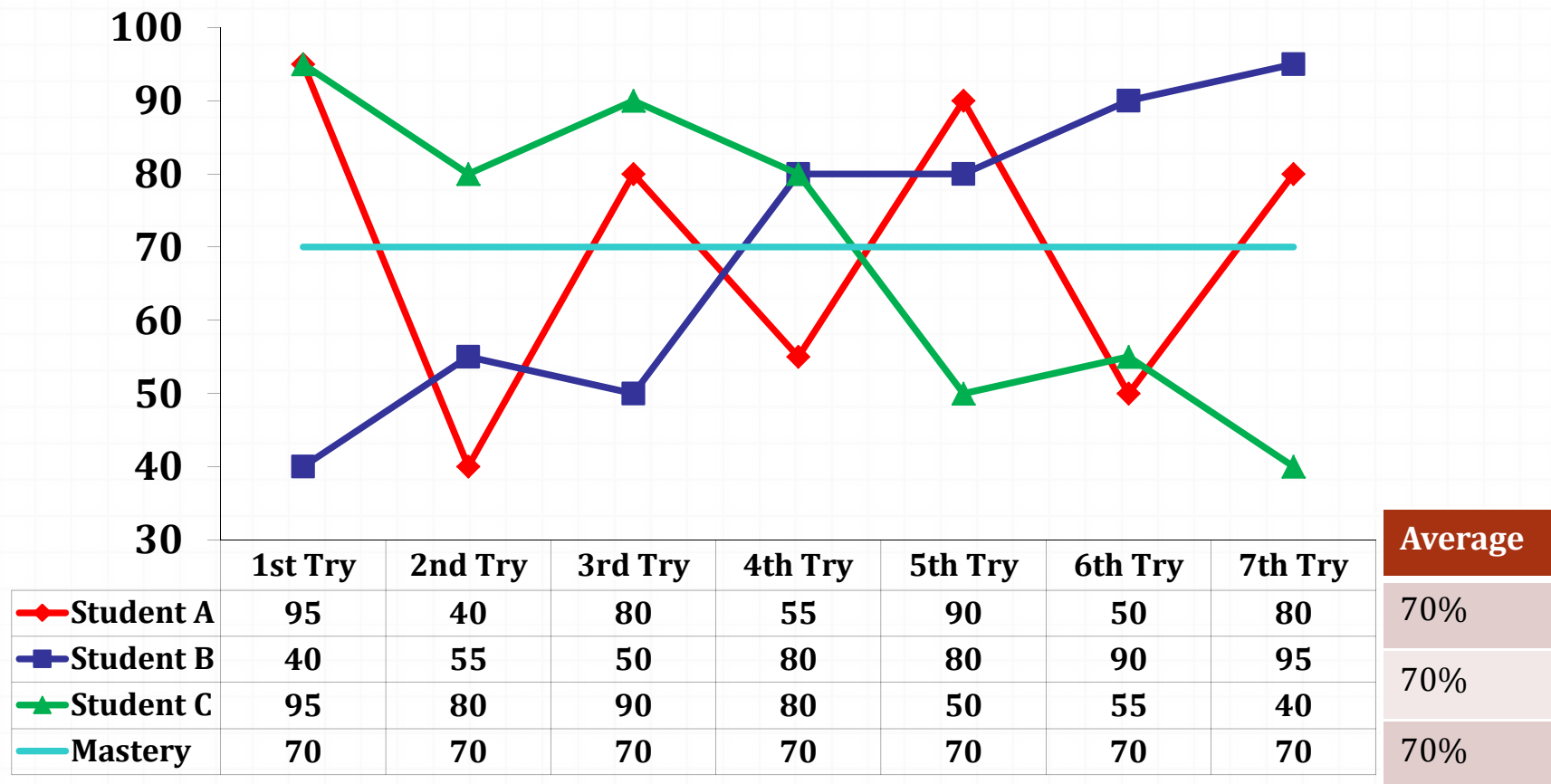
Adapted from How to Grade for Learning (O'Connor, 2002)

What type of feedback would you give each student  
– and how does the feedback evolve with each try?



Adapted from How to Grade for Learning (O'Connor, 2002)

If these were scores in a typical teacher's grade book, which students would pass? Which students would fail?



Adapted from How to Grade for Learning (O'Connor, 2002)

# Is “grading” everything fair and practical?

- o “If we just grade assignments and never use that information to help inform our instruction, we have wasted our students’ time and we have reinforced to students the false notion that the only reason they are learning the material is to take a test.”

Robyn R. Jackson

*Never Work Harder Than Your Students and other principals of great teaching*  
ASCD 2009

# Feed Up: Where am I going?

What is the goal? An average of 100% or the learning?

Ms. Noonan Reading		HW1					HW5	HW6	Character Project	Average
Last	First									
Anders	Jillian	10		10	10		10	10	10	100%
Baker	Bradley	7		9	9			10	10	87%
Bonham	Jessica	9			5	7		9	10	77%
Bragg	Heather	8		9	9	9		10	10	90%
Clinton	Sarah	8	8		9	10		10	10	91%
Conners	Thomas	6	6			5		6	6	57%
Conners	Timothy	8	9	9		10		9	9	90%
Dillon	Drew	7	8	8			10	10	10	88%
Drake	Samantha	8	9	10	10		10	9	10	92%
Frye	Leah	6					6	5	10	71%
Grant	Michelle	6					5	6	10	73%

*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*



# Feed Up:

- o “Why are we doing this?”
- o Elements that shape learners’ perceptions of their ability to learn: *(McTighe and O’Connor, 2005)*
  - o Task Clarity – understand learning goal and know how learning will be evaluated
  - o Relevance – think the goals and assessments are meaningful and worth learning
  - o Potential for Success – believe they can successfully learn and meet expectations

*From “Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning”  
2011 Frey and Fisher*

# Feed Up:

- o “Why are we doing this?”
- o Establishes the purpose:
  - o Content Purpose
  - o Language Purpose
  - o Social Purpose
- o Compliant learners are developed when the focus is on the activity or the score and not on the learning and their role in it...

*From “Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning”  
2011 Frey and Fisher*

# Checking for Understanding: Where am I now?



*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*

# Checking for Understanding: Where am I now?

“Thumbs-up if you can  
restate the main idea of  
the text we just read.”

PAUSE

“Great! Diana, please  
share.”



*From “Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning”  
2011 Frey and Fisher*

## From Mike Rush's 10 Guiding Principles

- 5. Ask text dependent questions
- 6. Provide extensive research and writing opportunities (claims and evidence) K-12
- 7. Offer regular opportunities for students to share ideas, evidence and research
- 10. Cultivate student independence



# Example Formative Assessment Techniques and Tools to Check for Understanding

- o Admit slips
- o Debriefing
- o Demonstration
- o Exit pass
- o Find the errors and fix them
- o Graphic organizers
- o Green and red flags
- o Group-based test prep
- o Hand signals
- o Hot-seat questioning
- o If you did know what would you say?
- o If you don't know, I'll come back to you
- o If you have learned it, help someone who hasn't
- o Index card summaries/questions
- o Journal entry
- o Kinesthetic assessments
- o Mini white boards
- o One minute papers
- o One sentence summary
- o Oral questioning and interviews
- o Popsicle sticks
- o Questionnaires
- o Self/peer assessment
- o Think-pair-share
- o Two stars and a wish



# Develop Intervention Plan

1. Identify mastery thresholds
2. Establish “red flags” when threshold not met (Alerts)
3. Develop ongoing assessment measures to identify red flags
4. Select appropriate interventions
5. Monitor the effectiveness of each intervention

*From “How to Support Struggling Students: Mastering the Principles of Great Teaching”  
2010 Jackson and Lambert*

## Report on: Ms. Thomas' 3rd Grade Class

School: Maplewo

Number of Stude



























Date Range: 9/26

Date: 11/8/11

Teachers can utilize reports from instructional programs to monitor students and plan for conferences to check for understanding.


### Summary

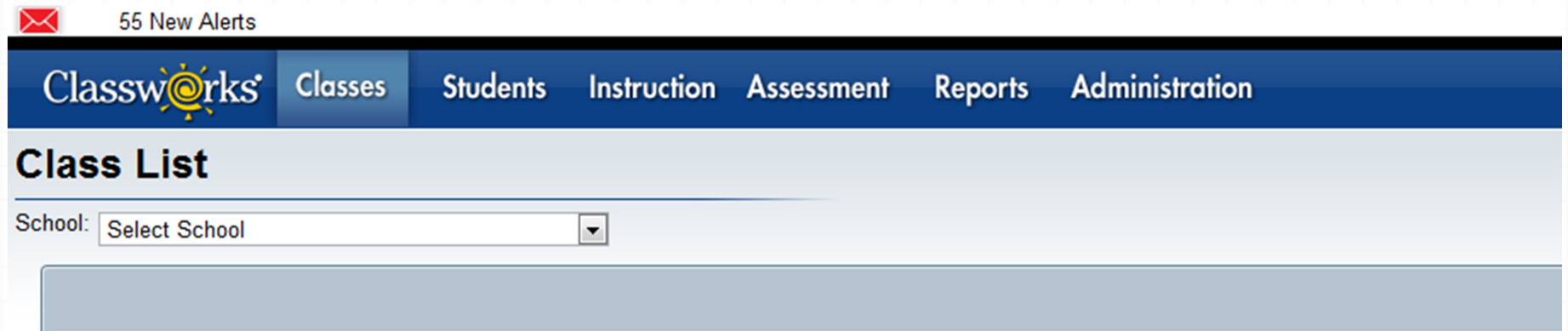
Threshold in this example is 70% mastery.

Student	Activity Score			Unit Score			Total
		Score	Total Time		Score	Total Time	
Adams, Brandon		76%	03:43:38		77%	01:58:17	05:41:55
Browning, Wendy		60%	03:08:11		65%	01:42:45	04:50:56
Diaz, Stacey		75%	02:25:01		80%	00:54:12	03:19:13
Dring, Bobbie		40%	04:16:04		55%	01:59:54	06:15:58
Gonzales, Thomas		80%	05:35:47		75%	02:01:58	07:37:45
Jackson, Angela		70%	03:36:51		85%	01:49:07	05:25:58
Morales, Cathy		83%	04:23:12		55%	00:32:03	04:55:15
Peters, Samantha		65%	01:41:52		60%	03:48:22	05:30:14
Reyes, Michael		82%	01:35:42		60%	04:01:35	05:37:17
Richardson, Douglas		75%	01:24:16		50%	03:00:14	04:24:30
Vasquez, Manuel		70%	05:17:50		72%	01:52:13	07:10:03
Williamson, Edward		90%	05:08:27		75%	01:17:33	06:26:00
Overall Assignment Score		72%	48:25:12		67%	18:49:52	67:15:04

70% 70%

# “Red Flags” (Alerts)

- 
- Example of Alerts:
    - Fail 2 consecutive activities
    - Fail a quiz
    - Overall mastery of unit below threshold (70%)



*From “How to Support Struggling Students: Mastering the Principles of Great Teaching”  
2010 Jackson and Lambert*

# “Red Flags” (Alerts)

Alert Units <span>▼</span>						Units	Projects
Unit	Grade	Status	Percent	Total Time			
<b>Adding 2- and 3-Digit Numbers with Regrouping</b>	Unit: 1188 2	<input checked="" type="radio"/> Assigned <input type="radio"/> Completed	49%	00:58:13			
Activity	Status	Percent	Total Time	Date Completed			
<a href="#">Mini-lesson</a>	<input type="radio"/> Assigned <input checked="" type="radio"/> Completed	-	00:25:03	5/4/12			
<a href="#">Add - 2 Digits + 1 Digit - Mixed - Random Rgrp</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Completed	40%	00:27:00	5/4/12			
<a href="#">Add - 2 Dig + 2 Dig Rndm Rgrp</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Completed	57%	00:04:43	5/4/12			
<a href="#">Add: Practice Sums to 99/Regroup</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:01:27	5/4/12			
<a href="#">Quick Quiz</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:00:00	-			
<a href="#">R. Digit + 1 Digit - Regrouping in One's Place</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:00:00	-			
<a href="#">R. Add: Using Sums to 99/Regroup</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:00:00	-			
<a href="#">R. 1 Digit + 2 Digit - Regrouping in One's Place</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:00:00	-			
<a href="#">R. Add: Recognizing Sums to 99</a>	<input checked="" type="radio"/> Assigned <input type="radio"/> Skipped	-	00:00:00	-			

*From “How to Support Struggling Students: Mastering the Principles of Great Teaching”  
2010 Jackson and Lambert*



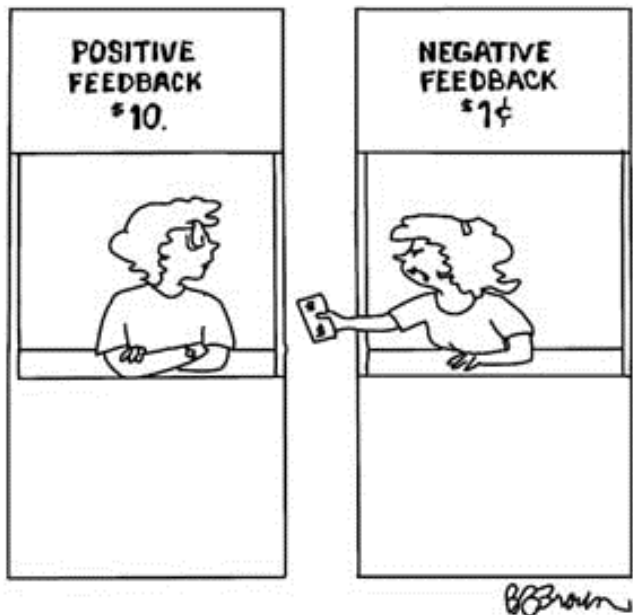
# Feedback: How am I doing?



*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*

“Feedback is not always or even usually successful.

- In one third of studies, feedback worsens performance.
- In one third of comparisons there is no difference in outcomes with and without feedback.
- Only in on third of studies did feedback consistently improve performance.”



"Here! Do me!"

P. Shepard, 2008



# Effective vs. Non-Effective Feedback

- o 80%
- o Well Done
- o You made some simple mistakes with multiplying three-digit numbers. Next time, take a few minutes when you have finished to check your work.
- o A+ Great Work
- o The arguments in your debate were supported with facts. You were able to defend your position when debating your opponent.
- o You Made the Same Mistake Again
- o Most of your spelling is correct. I found only two errors. See if you can find them.
- o That is a good essay.



# Evaluative Feedback

- o Sums up achievement and assigns a label. It expresses judgment.
- o Grades: A, B, C, D, F
- o Letters: P for proficient, D for developing, B for beginning
- o Words: Excellent, good, fair, poor
- o Other Symbols: smiley faces, stars, plus, checks
- o Stickers- Great Job! Awesome!

## **Descriptive Feedback**

It's the quality of the feedback rather than its existence or absence that determines its power. (Stiggins et al 2004)

- It should be given promptly
- Oral feedback (including discussion) is the most effective
- Comments should be limited in number and should give specific advice as to how goals can be achieved
- It should give the student a sense of what has been achieved as well as improvement still needs to be mastered

# Descriptive Feedback



- ◊ Grades are not helpful in a formative environment
- ◊ Targets and progress should be discussed with students while they are working on the task
- ◊ Students should reflect on the feedback and be given time to work on improvements
- ◊ Where appropriate, attempts should be made to involve parents in the learning triggered by feedback

## **Mastered Skills**

### **From Assessment**

Solving Problems: Is There Enough Information?

Introducing Least Common Denominator

Understanding the Rules of Division

More Function Tables

Properties of Multiplication

Finding Equivalent Fractions Using Models

Understanding Division

Understanding Basic Division Facts through Divisors of 5

Using Basic Facts Up to  $5 \times 10$

Using Basic Facts Up to  $9 \times 9$

Using Multiplication to Find Area

### **From ILP**

Using 1-Digit Multipliers

More Finding Area

Basic Facts: Missing Factors

Multiplication and Division Fact Families

Multiplication Facts for 10, 11, and 12

Using Basic Division Facts through Divisors of 9

Solving Problems by Choosing Multiplication or Division

## **Remaining Skills**

### **Assigned**

Estimating Products

Divisibility Rules: 2, 3, and 5

Estimating Quotients

2-Digit Divisors and Dividends Up to 4 Digits

Using Zero in the Quotient

### **Not Mastered**

Using 2-Digit Multipliers

1-Digit Divisors and Dividends up to 4 Digits

# Feed-Forward: Where am I going next?

- Misconception Analysis
  - Allows teachers to decide who needs further instruction and in what areas
  - Determines foundation for precise teaching/re-teaching



*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*



# Feed-Forward: Check for Understanding...

## ○ Questioning

- Elicitation
- Elaboration
- Clarification
- Divergent
- Heuristic
- Reflective



*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*

## Self and Peer Assessment

### Engage students in the process

- Teachers must create an environment where students feel that they are partners in the learning process
- Engage students in setting learning goals
- Support students monitoring of their own progress towards learning goals so students are able to articulate where they are and what needs to be accomplished next
- Work with other students – not necessarily at the same level of understanding



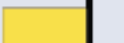
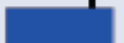












# Student record keeping

- Helps students better understand their own learning as evidenced by their classroom work.
- Provides ongoing records of student work
- Engages students and helps them to see where they started and the progress they are making toward the learning goal.
  - Side note- Teacher evaluation

# INSTRUCTION RESULTS

## Assignment Results

		Activity Score			Unit Score			
	ILP		Score	Time		Score	Time	Total Time
Compare Fractions			-	00:12:34			00:00:00	00:12:34
Geometry Review	✓		100%	00:21:48		100%	00:00:00	00:21:48
Geometry Review			70%	00:11:47		90%	00:02:08	00:13:55
Geometry Review			79%	00:12:12		90%	00:01:19	00:13:31
Measurement 2.1_ILP	✓		89%	00:03:53		89%	00:00:00	00:03:53
Measurement 3.1_ILP	✓		94%	00:24:27		97%	00:02:29	00:26:56
Numbers			-	00:03:08			00:00:00	00:03:08
Shapes			97%	00:07:12		97%	00:00:00	00:07:12
Colors			67%	00:02:32		67%	00:00:00	00:02:32
		70%			70%			

Note: Unit Score = Unit test or the average of the activities (Skill Builders)

### Key:



Not Proficient (0-64%)



Borderline (65-74%)



Proficient (75-84%)



Highly Proficient (85-100%)

This report uses a mastery percentage of 70% for all instruction.

# Framework for Formative Data

1. Feed Up: Where am I going?
2. Checking for Understanding: Where am I now?
3. Feedback: How am I doing?
4. Feed-Forward: Where am I going next?

*From "Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning"  
2011 Frey and Fisher*

## Collaboration

Provide time, support, and instruction in order for students to adjust, implement, and process their learning

- o Follow assessments with time to collaborate with other students
- o Use technology (i.e. after school via Skype, flipped classroom)
- o Make sure additional (and different) instruction is provided
- o Work with students independently and in small groups
- o Review what was taught in relation to its connection the target
- o Collaborate with colleagues (8<sup>th</sup> grade example)





Five Critical Elements of Formative Assessment	1	2	3
Indicate how students are moving toward proficiency of a standard	Is general in nature and not targeted to a standard	References a standards but does not indicate where the student is related to proficiency	Specifically targets the component of a standard being worked on and identifies where they are and where they need to be
Identify the current level of understanding in relation to expectations	Is a graded piece of work with nothing to assist in student learning	May identify areas of weakness but does not clearly show skills to work on	Clearly identifies specific strengths and weaknesses as well as what next steps must be taken to be proficient at a certain level
Provide specific and appropriate feedback	Comes in the form of a letter grade, a star or other vague, non-supportive feedback	Feedback provides students with general information, some of which might be used to assist in learning	The feedback is ongoing, specific, targeted to the learning taking place, and assists the student in moving forward.
Engages students in the process	Students receive a grade but are not sure what they did wrong or what to do next	Students go over the assessment and discuss what they got wrong and, perhaps, why. Next steps are not outlined.	Students and teachers discuss the goals and expectations and then discuss those as a result of the assessment. Students then describe what they will do next.
Provide time, support, and instruction in order for students to adjust, implement, and process their learning	The assessment is returned with errors noted and the teacher moves to the next topic	Students are given time to correct their errors but are not assisted by either their peers or the teacher	Time is provided for students to work independently or in small groups while the teacher provides assistance, mini-teaching sessions, and clarifies misconceptions

# Sample item: Performance event

## Gas Bills, Heating Degree Days, and Energy Efficiency

*Here is a typical story about an Ohio family concerned with saving money and energy by better insulating their house.*

Kevin and Shana Johnson's mother was surprised by some very high gas heating bills during the winter months of 2007. To improve the energy efficiency of her house, Ms. Johnson found a contractor who installed new insulation and sealed some of her windows. He charged her \$600 for this work and told her he was pretty sure that her gas bills would go down by "at least 10 percent each year." Since she had spent nearly \$1,500 to keep her house warm the previous winter, she expected her investment would conserve enough energy to save at least \$150 each winter. (10% of \$1,500) on her gas bills.

Ms. Johnson's gas bill in January 2007 was \$240. When she got the bill for January 2008, she was stunned that the new bill was \$235. If the new insulation was going to save only \$5 each month, it was going to take a very long time to earn back the \$600 she had spent. So she called the insulation contractor to see if he had an explanation for what might have gone wrong. The contractor pointed out that the month of January had been very cold this year and that the rates had gone up from last year. He said her bill was probably at least 10% less than it would have been without the new insulation and window sealing.

Ms. Johnson compared her January bill from 2008 to her January bill from 2007. She found out that she had used 200 units of heat in January of 2007 and was charged \$1.20 per unit (total = \$240). In 2008, she had used 188 units of heat but was charged \$1.25 per unit (total = \$235) because gas prices were higher in 2008. She found out the average temperature in Ohio in January 2007 had been 32.9 degrees, and in January of 2008, the average temperature was more than 4 degrees colder, 28.7 degrees. Ms. Johnson realized she was doing well to have used less energy (188 units versus 200 units), especially in a month when it had been colder than the previous year.

Since she used gas for heating only, Ms. Johnson wanted a better estimate of the savings due to the additional insulation and window sealing. She asked Kevin and Shana to look into whether the "heating degree days" listed on the bill might provide some insight.

<b>Argon Energy Co.</b>	<b>Customer</b> Ms. Arlene Johnson 42 Bluebonnet Ave. Columbus, OH 43205	<b>Bill Date</b> January 31, 2008 <b>Account #</b> 55-733420 Residential
<b>Current Itemized Bill</b>		
December 30	reading actual	8300
January 31	reading actual	8400
Total units used January 2008		188
<b>Energy Use History</b>		
Total units used January 2007		200
January 2007	1000 heating degree days 0 cooling degree days	
<b>TOTAL CURRENT CHARGES</b>		<b>\$235</b>

## Sample item: performance event

- a. Assess the cost-effectiveness of Ms. Johnson's new insulation and window sealing. You will need to research on "heating degree days" on the internet. In your response, you must do the following:
- Compare Ms. Johnson's gas bills from January 2007 and January 2008.
  - Explain Ms. Johnson's savings after the insulation and sealing.
  - Identify circumstances under which Ms. Johnson's January 2008 gas bill would have been at least 10% less than her January 2007 bill.
  - Decide if the insulation and sealing work on Ms. Johnson's house was cost-effective and provide evidence for this decision.

Enter response here



Submit

## Sample item: performance event

- b. Create a short pamphlet for gas company customers to guide them in making decisions about increasing the energy efficiency of their homes. The pamphlet must do the following:
- List the quantities that customers need to consider in assessing the cost-effectiveness of energy efficiency measures
  - Generalize the method of comparison used for Ms. Johnson's gas bills with a set of formulas, and provide an explanation of the formulas.
  - Explain to gas customers how to weigh the cost of energy efficiency measures with savings on their gas bills.

When you have completed your pamphlet, upload it using the button below.

## To help students become skilled at self-assessment, teachers can:

- Explicitly identify, share, and clarify learning goals and success criteria
- Model the application of criteria using samples
- Provide guided opportunities to peer- and self-assess
- Provide students feedback on the quality of their peer- and self-assessments
- Teach students how to use feedback to determine next steps and set goals.

(Adapted from Rolheiser & Ross, 2000)

## Formative Data in the World of Common Core State Standards

- o Know where students are struggling before it becomes destructive to learning
- o Make adjustments to instruction to ensure a deep level of understanding
- o Match instruction and assessments to the expectations for the quarter
- o Develop a comprehensive set of assessments matched to the level of rigor



## For Students to be Successful, They Must:

- Understand the target
- Understand how mastery will be measured
- Be provided “good” and “bad” examples of responses to the assessment so as to clarify criteria
- Understand what they must master in en-route to mastery of the target
- Make the connection to prior knowledge
- Apply the learning to new situations



If you can't use data tomorrow from your assessment today, then it is not formative. We need to provide descriptive feedback immediately otherwise it is NOT formative assessment.



# A Few Resources

- o Formative Assessment Action Plan: Practical Steps to More Successful Teaching and Learning, Nancy Frey and Douglas Fisher, 2011
- o How to Support Struggling Students, Robyn R. Jackson and Claire Lambert, 2010
- o Never Work Harder than Your Students, Robyn R. Jackson, 2009
- o How to Give Effective Feedback to Your Students, Susan M. Brookhart, 2008
- o Transformative Assessment , W. James Popham
- o Creating and Recognizing Quality Rubrics , Educational Testing Service, Judith A. Arter, and Jan Chappuis
- o Seven Strategies of Assessment for Learning (Assessment Training Institute, Inc.), Jan Chappuis
- o Unlocking Formative Assessment: Practical Strategies for Enhancing Pupils' Learning in the Primary Classroom , Shirley Clarke
- o Formative Assessment & Standards-Based Grading , Robert Marzano
- o Assessment Crisis: The Absence of Assessment FOR Learning, Richard J. Stiggins, Phi Delta Kappan, June 2002
- o Assessment for Learning: Putting It into Practice, Paul Black et al.
- o Formative Assessment and the Design of Instructional Systems, D. Royce Sadler
- o National Council for Teachers of Mathematics: Five “Key Strategies” for Effective Formative Assessment, Dylan Wiliam

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