

STEM Assessment:
When the whole is greater
than the sum of its parts!

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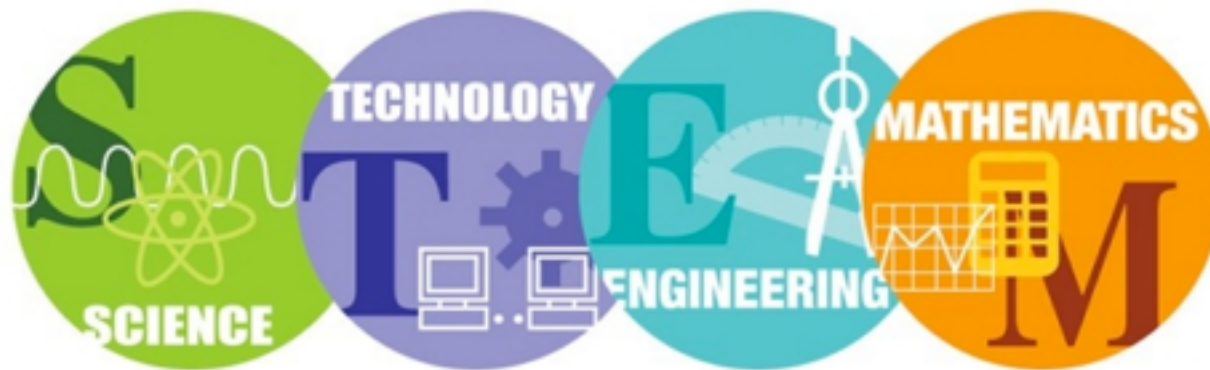


Follow Along?

♡ bgsu.edu/nwosymposium

NWO SYMPOSIUM

Bowling Green State University / NWO / Programs / NWO Symposium



Northwest Ohio Symposium on Science, Technology, Engineering, and Mathematics Teaching

GNWO ANNUAL SYMPOSIUM ON SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS TEACHING

NOVEMBER 19, 2016

8:30 AM - 4 PM

**Olscamp Hall
Bowling Green State University**

Featuring the 2016 keynote speaker: Dr. Jodi Haney

Presentation Slides



*Assess: to sit beside
with the goal of IMPROVING... taking NEXT step.*

FORMATIVE SUMMATIVE



WHEN THE **CHEF**
TASTES THE SOUP



WHEN THE **GUESTS**
TASTE THE SOUP



**KEEP
CALM**

AND

**SHOW WHAT
YOU KNOW**

False +

False -

Assessment shows MORE understanding that what is really there	Assessment shows LESS understanding that what is really there
--	--

Both problematic & endanger teaching and learning

Need a JUST RIGHT Classroom Assessment Plan



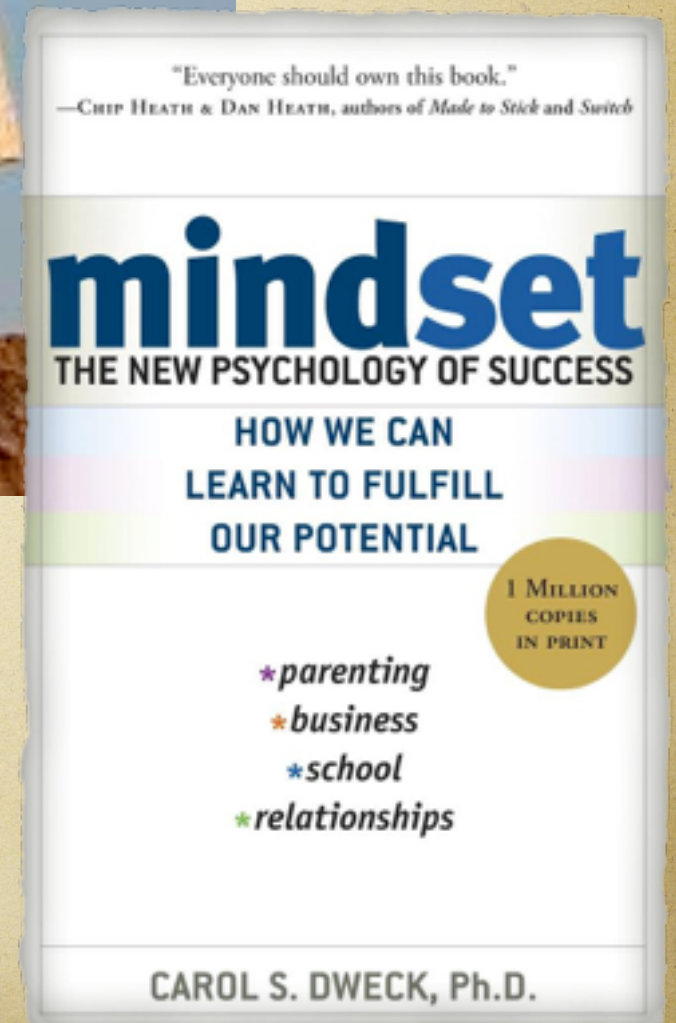
Allowing students to show ALL of what they know
to avoid false positives and NEGATIVES.

Self Efficacy:

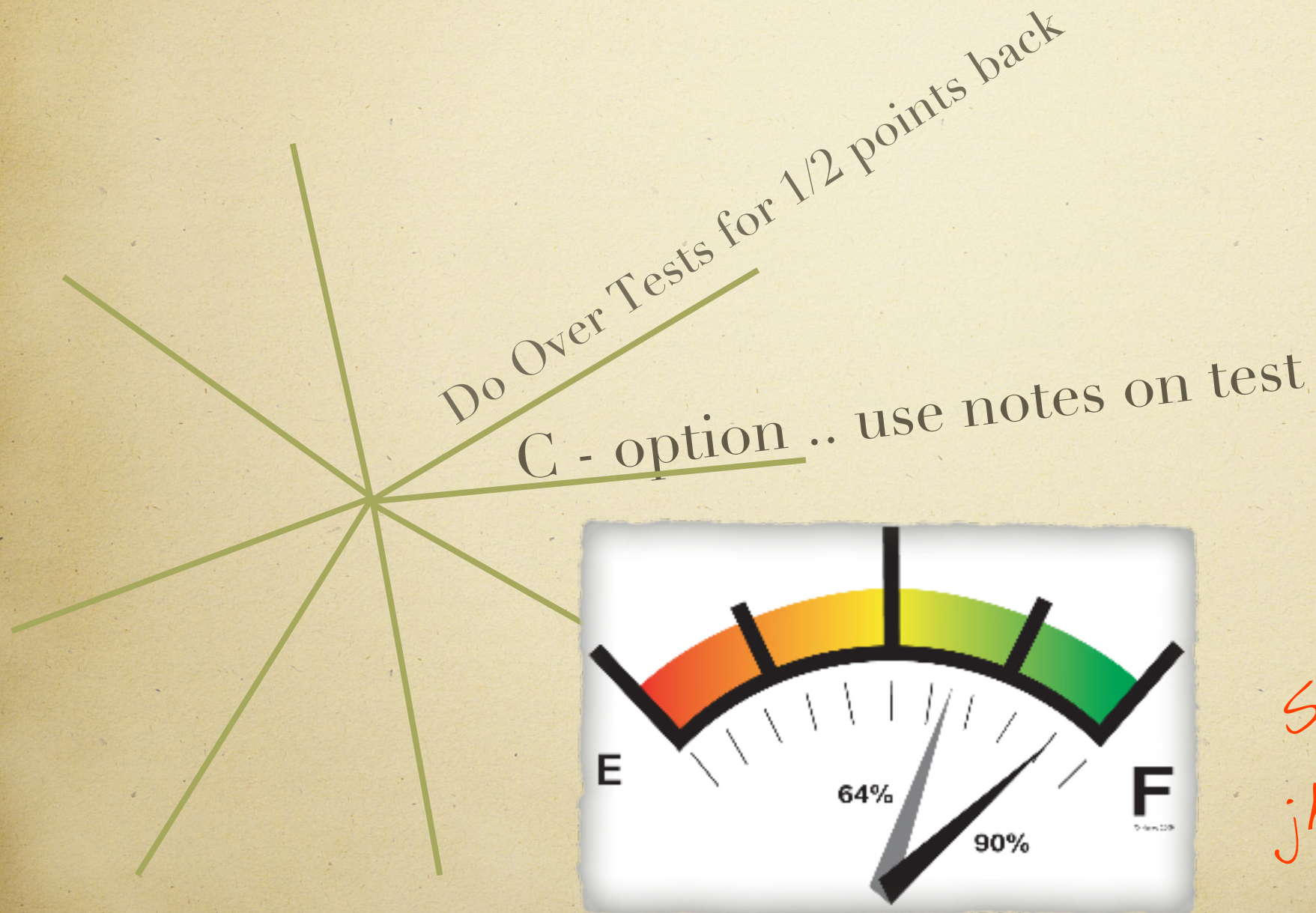
Belief that I have
the skill and ability
to do this thing!

Growth **Mindset**:

Carol Dweck
Intelligence is
malleable and
grows with effort &
perseverance!



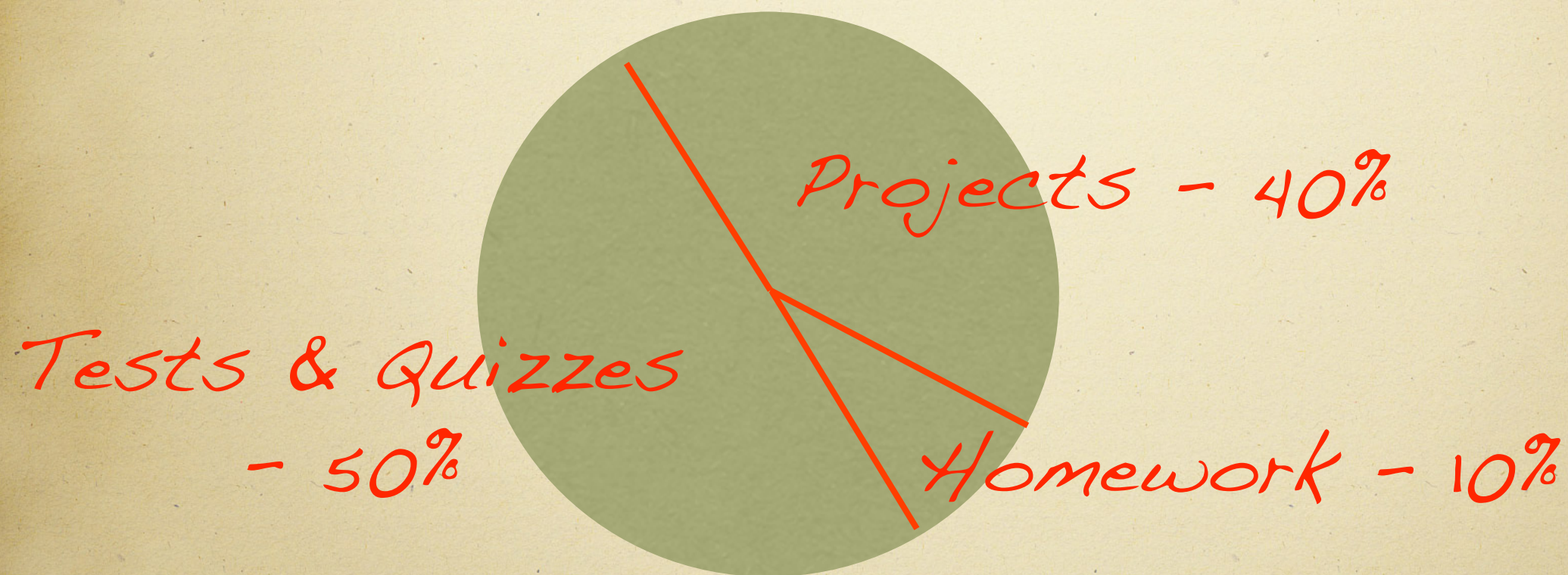
What are Some Classroom Strategies for + Self Efficacy * Growth Mindset (Persistence)? Via a “What Wheel”



Sign it: jhaney
jhaney3@mac.com

Graffiti Pie Chart: Your Classroom Assessments - NOW.

[9 week grading period]

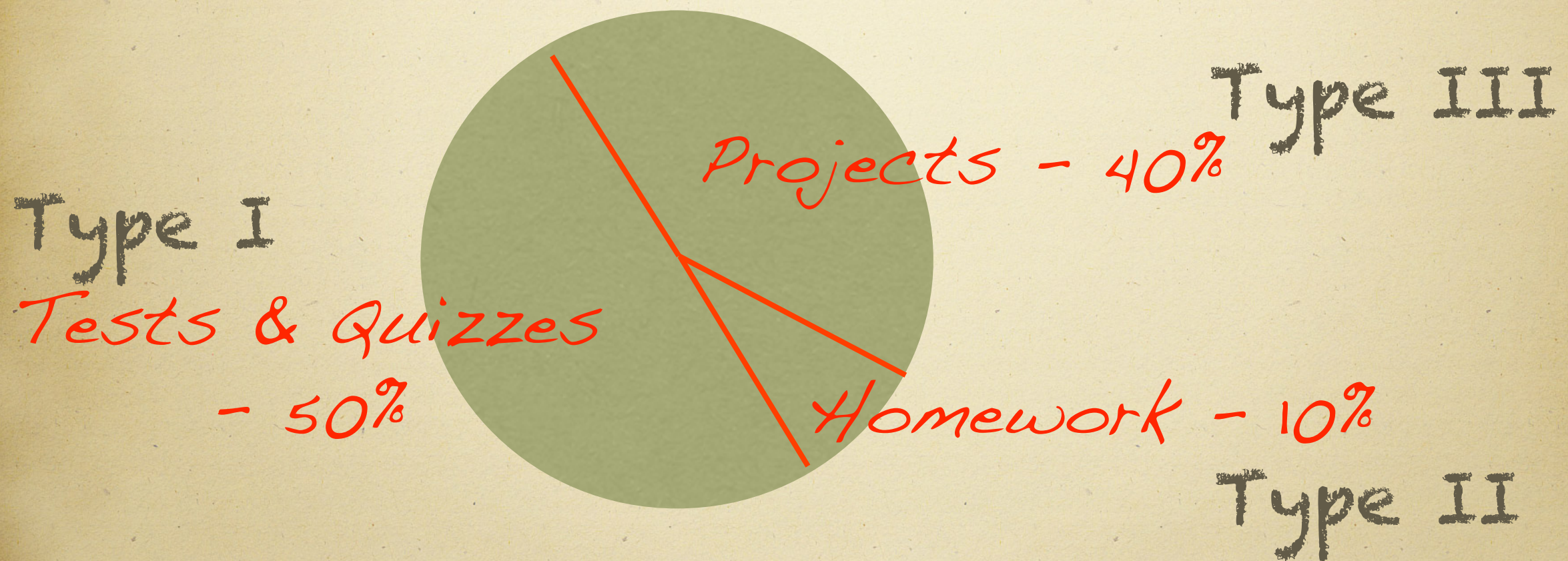


Going Retro (1994)

ODE Assessments: Classroom Assessment:

- Type 1 (Write/Say),
- Type 2 (Do/Perform), and
- Type 3 (Create/Produce) assessments
- See Article “[Assessing Student Success](#)” by...me ;-)

Graffiti Pie Chart: Tag Type I, II, III

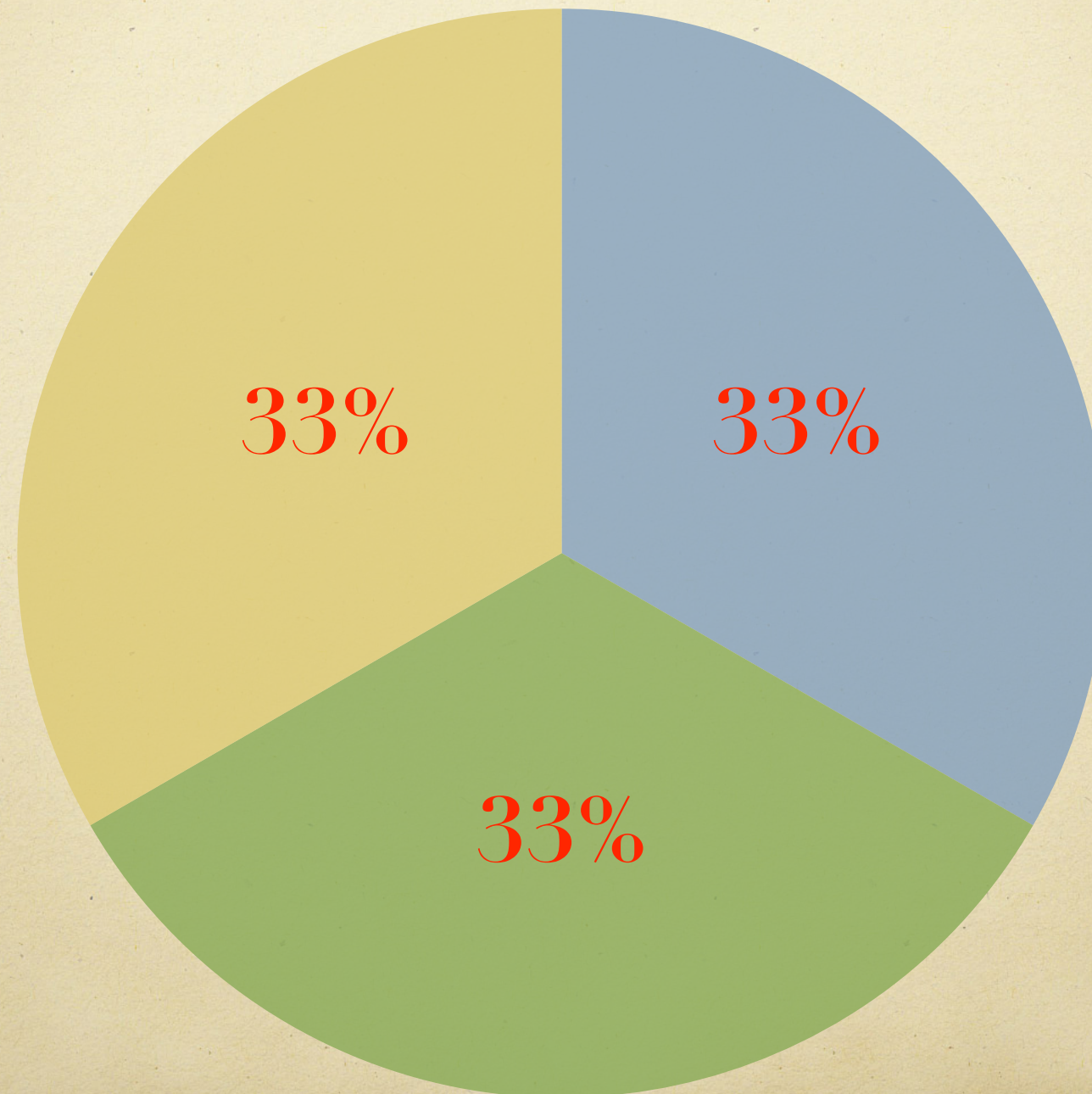


■ Type I

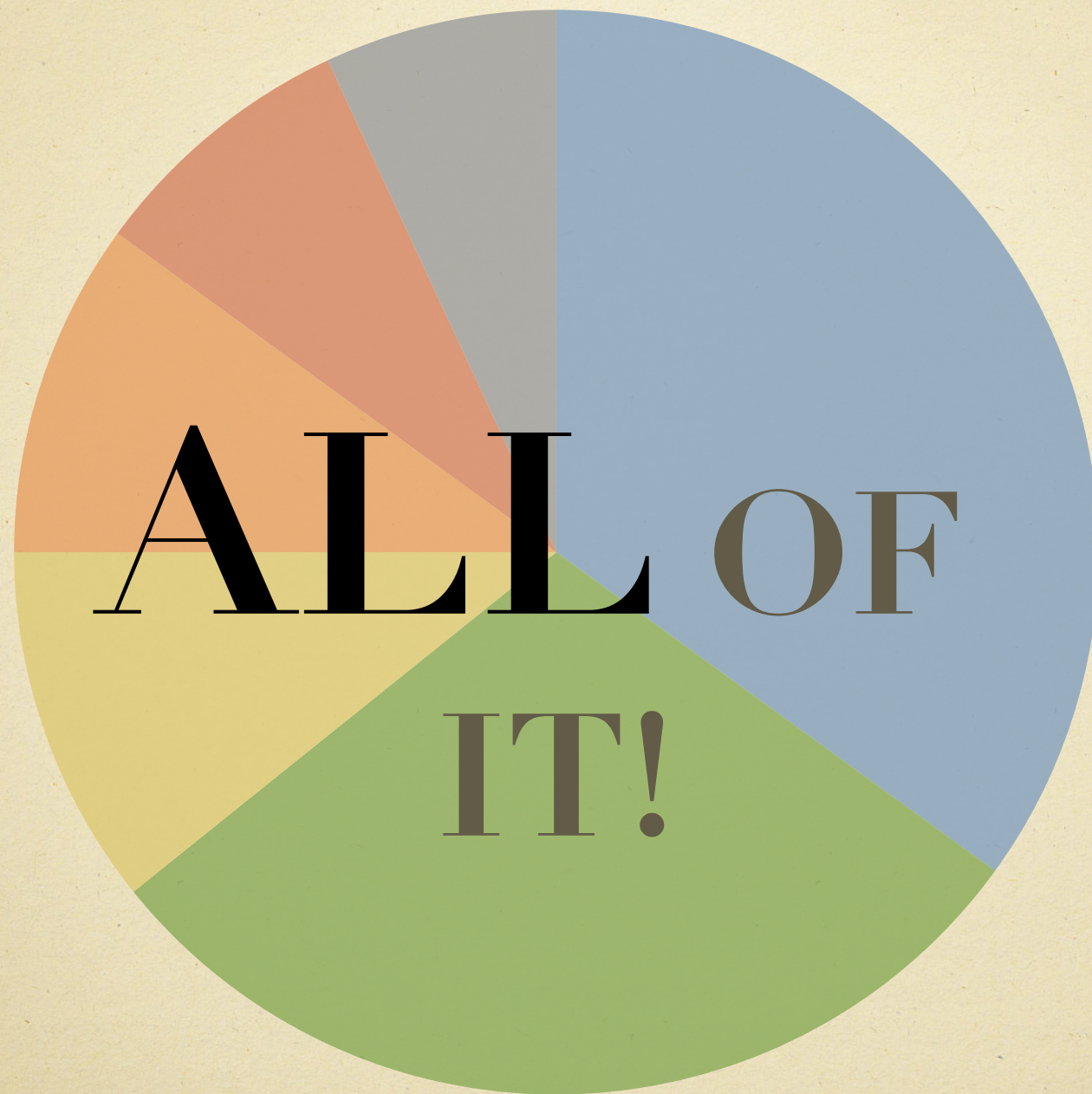
■ Type II

■ Type III

Science Grades: 9 Week Term



We should MEASURE what matters....



Standardized AND Classroom tests
measure but a thin slice!

TRAVEL
GRAFFITI

Type I
[write/say]

- quizzes - 10%
- tests - 10%

Type II
[do/perform
“right now”]

Type III
[produce/create
“over time”]

100% is all you get ;)

Sign it: jhaney
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Total = ____%
[20 - 40%]

Total = ____%
[20 - 40%]

Total = ____%
[20 - 40%]

In Jodi's World...

Type I [write/say]	Type II [do/perform]	Type III [produce/create]
<ul style="list-style-type: none"> • Quick quiz • Final exam • Concept maps • Discussion boards • Interactive Notebooks • Keeley Assessment Probes 	<ul style="list-style-type: none"> • Performance indicator • Homework • Peer teaching • Presentations • Earth Day/service learning festivities • Science Investigations 	<ul style="list-style-type: none"> • Green Fund Proposal • Digital Content Creation for public audience • GLOBE Action Plan

TRAVEL GRAFFITI

Type I
[write/say]

Type II
[do/perform]

Type III
[produce/create]

• quiz - 10 %

• Performance

• Habitats Project



Total = 30%

Total = 40%

Total = 30%

Type II: Performance Indicator [10%]

100% Leader in class. Volunteers frequently for in-class activities, frequently asks thoughtful questions and answers questions with appropriate/thoughtful/logical responses. Demonstrates strong performance on both in-class and out of class assignments. Regularly demonstrates both passion and respect during course and/or online discussions. Adds significantly to a positive learning environment. Performance is highly consistent, accurate, and strong overall.

HIGHLY ENGAGED STUDENT/LEADER. A maximum of 0 unexcused absences for this course.

85% - Active Participant in class. Regularly volunteers for in-class activities, asks thoughtful questions and answers questions with appropriate/thoughtful/logical responses. Demonstrates solid performance on both in-class and out of class assignments. Demonstrates respect. Performance is consistent, mostly accurate, and solid overall. **MOSTLY ENGAGED STUDENT.** A maximum of 2 unexcused absences for this course.

70% Regular Participant in class. Sometimes asks thoughtful questions, sometimes answers questions with appropriate/thoughtful/logical responses. Demonstrates adequate performance on both in-class and out of class assignments. Performance is not always consistent or accurate, but adequate overall. **SOMEWHAT ENGAGED STUDENT.** A maximum of 4 unexcused absences for this course.

55% Sporadic Participant in class. Rarely asks thoughtful questions or answers questions with appropriate/thoughtful/logical responses, etc. Performance is not consistent, often inaccurate and weak overall. **RARELY ENGAGED STUDENT.** A maximum of 6 unexcused absences for this course.

0 % - DISENGAGED STUDENT. Did not meet the expectations above.

**** Must meet all criteria in any category to receive the score for that category.**



Balanced Levels of Thinking for all types

BLOOM's Taxonomy Simplified... +

- **Acquiring** (facts, memory/recall)
- **Processing** (NEW questions/tasks requiring thinking/transfer of knowledge)
- **Extending** (synthesizing/analyzing multiple bits of NEW information)

ODE 2014 Cognitive Demands

➤ **Recalling / Identifying Accurate Science**

- Students provide and identify accurate statements about previously learned, scientifically valid facts, concepts and relationships described by the Ohio Academic Content Standards, K-12 Science.

➤ **Communicating Understanding / Analyzing Science Information**

- Students analyze scientific information and communicate scientifically, given rich investigative scenarios and valid scientific data and information.

➤ **Demonstrating Investigation Processes of Science**

- Students use scientific inquiry skills, grounded in standards-based science content.

➤ **Applying Concepts / Making Relevant Connections with Science**

- Students apply science in the context of individuals and society and scientifically analyze consequences and alternatives, given rich, real-world situations and technological problem-solving scenarios.

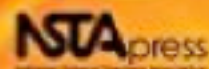
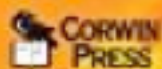
Type I Assessments to SHOW WHAT THEY KNOW

SCIENCE Formative Assessment

75 Practical Strategies for Linking
Assessment, Instruction, and Learning



A Joint Publication



Page Keeley

VOL. 2

Uncovering Student Ideas in Science

25 More Formative
Assessment
Probes

By Page Keeley,
Francis Eberle,
and Joyce Tugel

Physical Science and Nature of Science Assessment Probes

12

Doing Science

Four students were having a discussion about how scientists do their work. This is what they said:

Antoine: "I think scientists just try out different things until something works."

Tamara: "I think there is a definite set of steps all scientists follow called the scientific method."

Marcos: "I think scientists use different methods depending on their question."

Avery: "I think scientists use different methods but they all involve doing experiments."

Which student do you most agree with? _____

Explain why you agree with that student and include why you disagree with the other students.



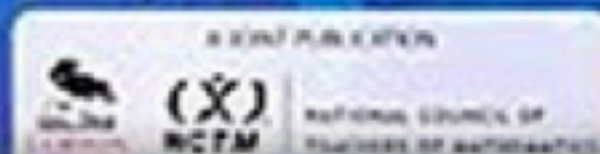
MATHEMATICS

Formative Assessment

75 Practical Strategies for Linking
Assessment, Instruction, and Learning



Page Keeley
Cheryl Rose Tobey



Examples of FACTs and Probes

- Whiteboarding – Batteries, Bulbs, & Wires probe
- Four Corners – Ice Cold Lemonade probe
- Card Sort – Is it Melting? probe
- Commit & Toss – Solids & Holes probe
- Human Scatterplot – Mirror on the Wall probe
- Sticky Bars – Giant Sequoia Tree probe
- P-E-O-E – Ice Cubes in a Bag probe

Is It Melting?

The strips of paper you have in front of you each list a situation that causes changes in materials.

Organize the strips into 2
categories:

Melting and Not Melting

Is It Melting?

The list below involves situations that cause changes in materials. The materials are *italicized*. Put an X next to the situations in which the *italicized* materials undergo melting.

- ___ **A** Putting a bowl of frozen *ice cream* in the sun.
- ___ **B** Sawing *wood* to make sawdust.
- ___ **C** Dissolving *salt* in water.
- ___ **D** Adding a *LifeSaver* candy to a glass of warm water.
- ___ **E** *Water* evaporating from a pan.
- ___ **F** Dissolving a *sugar cube* in a cup of hot tea.
- ___ **G** Pouring vinegar on *baking soda*.
- ___ **H** Sucking on a *lollipop* or other *hard candy*.
- ___ **I** Holding an *ice cube* in your hand.



Explain your thinking. Describe the “rule” or reasoning you used to decide if something melts.

Commit & Toss with Sticky Bars

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Which student do you most agree with? _____

Explain why you agree with that student and include why you disagree with the other students.



Google Form:

<https://goo.gl/forms/1ViczzXG10Kmodbg2>

STUDENTS SHOW
WHAT THEY KNOW
by Teachers
UNCOVERING
STUDENT IDEAS!

Type I, II, III ? Why?

[Write/Say, Do/Perform/Create/Produce]

Level of Thinking A.P.E.?

[acquire facts/process ideas/extend & apply]

Cognitive Demand?

[recall/interpret/thinking-inquiry/apply]

A Word About Packaged Assessment Systems

- STAR, MAP, TeraNova, Study Island, etc.
- **Criterion Validity** typically fine (items measure what they say they do)
- **Predictive Validity** often weak (items predict success on future standardized assessments)
- **MOST IMPORTANTLY... If & HOW** the data is used to improve instruction! **THIS TAKES MORE TIME THAN MOST DISTRICTS PROVIDE** (another “planning” period for teachers)

**You Don't Fatten A Pig
By Weighing It**



... FEED THE PIG!

Breakfast in Bed: Holistic Rubric

Score	Description
4	All food is perfectly cooked, presentation surpasses expectations, and recipient is kept exceptionally comfortable throughout the meal.
3	Food is cooked correctly, the meal is presented in a clean and well-organized manner, and the recipient is kept comfortable throughout the meal.
2	Some food is cooked poorly, some aspects of presentation are sloppy or unclean, or the recipient is uncomfortable at times.
1	Most of the food is cooked poorly, the presentation is sloppy or unclean, and the recipient is uncomfortable most of the time.

Breakfast in Bed: Analytic Rubric

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Food	Most food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	Some food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	All food is at the correct temperature, adequately seasoned, and cooked to the eater's preference.	All food is perfectly cooked and seasoned to the eater's preference. Additional condiments are offered.	
Presentation	More than one item (tray, napkin, or silverware) are dirty or missing.	Tray, napkin or silverware may be dirty or missing.	Food is served on a clean tray, with napkin and silverware. Some decorative additions may be present.	Food is served on a clean tray, with napkin and silverware. Several decorative touches are added.	
Comfort	Wake-up is abrupt, little to no help with seating, and the recipient is rushed and crowded during the meal.	Wake-up is somewhat abrupt, recipient may struggle with seat adjustment, or there may be some rushing or crowding during eating.	Recipient is woken gently, assisted in seat adjustment, and given reasonable time and space to eat.	Recipient is woken gently and lovingly, assisted until seating is just right, and given abundant time and space to eat.	

Breakfast in Bed: Analytic Rubric

55%

70%

85%

100%

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Food	Most food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	Some food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	All food is at the correct temperature, adequately seasoned, and cooked to the eater's preference.	All food is perfectly cooked and seasoned to the eater's preference. Additional condiments are offered. ★	4 or 100%
Presentation	More than one item (tray, napkin, or silverware) are dirty or missing.	Tray, napkin or silverware may be dirty or missing. ★	Food is served on a clean tray, with napkin and silverware. Some decorative additions may be present.	Food is served on a clean tray, with napkin and silverware. Several decorative touches are added.	2 or 70%
Comfort	Wake-up is abrupt, little to no help with seating, and the recipient is rushed and crowded during the meal.	Wake-up is somewhat abrupt, recipient may struggle with seat adjustment, or there may be some rushing or crowding during eating. ★	Recipient is woken gently, assisted in seat adjustment, and given reasonable time and space to eat.	Recipient is woken gently and lovingly, assisted until seating is just right, and given abundant time and space to eat.	2 or 70%

Ordinal Scale (8/12 or 67%) vs. Interval % scales (80%)

Breakfast in Bed: Analytic Rubric

55%

70%

85%

100%

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Food	Most food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	Some food is colder or warmer than it should be, is under- or over-seasoned, or is under- or overcooked.	All food is at the correct temperature, adequately seasoned, and cooked to the eater's preference.	All food is perfectly cooked and seasoned to the eater's preference. Additional condiments are offered.	
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Math!
Back of the Envelope
Your Turn:

1, 2, 3, 4 Scale (___/12 or ___%) vs. % scales (___%)

Big Ideas...

Good Classroom Assessment is a COMPLEX SYSTEM!

1. START with growth mindset strategies - **PERSISTENCE**
2. Design by aligning Curriculum, Instruction, Assessment (**CIA**) - Verb Agreement
3. CHECK it for **BALANCE** (Type I, II, III/Cognitive Demands/mindset opportunities)
4. Score **Fairly** (Rubrics: Use % vs. 4,3,2,1)
5. Influence district for time needed for **Meaningful Use of the Data** for individualized instruction
6. **Reflect & MODIFY** your assessment system regularly



Measuring What Matters Workshop December 5 & 6, 2016

[Registration Ends November 28th]

8:30 am - 3:30 pm

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Questions?

Thank You for this Opportunity!