WFMS THINKING & PROBLEM SOLVING JANUARY 2024

CONSIDER...

IF A LESSON IS BEING TAUGHT AT THE "ROCK SOLID" 3 LEVEL FOR THE INDICATOR THINKING,

THEN WHAT MIGHT <u>WE HEAR STUDENTS SAYING</u> AND <u>SEE</u> STUDENTS DOING?

THINKING

Students saying & doing SO...

WHAT WOULD THE TEACHER HAVE TO KNOW AND DO TO ENSURE STUDENTS HAD OPPORTUNITIES IN THE LESSON?

THINKING

saying & doing

Teacher Know & Do

THINKING & PROBLEM SOLVING

- ✓ Managing complex tasks
- ✓ Working at higher levels of learning
- ✓ 4 Main Ways to SupportStudents in their Thinking

QUESTIONING

Higher-level questioning
Learners must be
presented with problems
and questions, the answer
to which are not apparent.

RESPONDING

Wait time
Accepting without
judgement
Clarify when you don't
understand
Academic feedback
Empatnizing

MODELING

Emulating others is a basic way of learning. Model what you expect. Do NOT be a "do-as-I-say, not-as-I-do" educator.

STRUCTURING

Clear expectations
Thinking happens
throughout the school
day, across content
areas, over extended

THINKING is the

PROCESS

PROBLEM SOLVING is the

PRODUCT

1. Students persevere through challenging tasks requiring the application of thinking models.



2. Students support responses with relevant justification and reasoning.

ARGUMENT PRESENTATION ON A WHITEBOARD

THE GUIDING QUESTION:

OUR CLAIM:

YOUR ANSWER TO THE GUIDING QUESTION

OUR EVIDENCE: ANALYSIS SHOW A TREND, DIFFERENCE OR A RELATIONSHIP A B This graph indicates... This graph shows... This graph suggests... The ANALYSIS MEANS

Our Justification of the Evidence:

We used this evidence because... This evidence is important

because...

REASON EXPLAIN WHY THE EVIDENCE MATTERS

2. Students support responses with relevant justification and reasoning.

Question: Given or determined by your problem.



Claim: A claim is a statement of your understanding about the results of an investigation The claim answers the original question. Make your claim based on data you have collected or have been given.

Evidence:

Use data to support your claim. You must have strong evidence (data) to support your daim.

Justification of the Evidence:

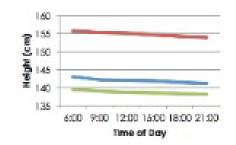
Reasoning or justifying your evidence means to document the logic of your claim.

2. Students support responses with relevant justification and reasoning.

QUESTION: Does a person's height change throughout the day?

CLAIM: A person's height decreases throughout the day as gravity pulls down on their body.

EVIDENCE: Data



Interpretation: The height of the students decreased by an average of 1.7 cm throughout the day.

REASONING:

- We saw an avg 1.7 cm decrease in height across a 15 hour day.
 We took measurements
- We took measurements at the same time for each person.
- Students measured spent roughly the same amount of time sitting and standing.

3. Students identify and discuss their individual progress toward mastery of the objective.

With Calmpridge, of	Self-Assess	ment Rubric	
4 - Exceeds	3 – Meets	2 - Approaching	1 – Below
I have a complete understanding of the learning target	I have a complete understanding of the learning target.	I have some understanding of the learning target.	I don't understand the learning target.
and I can apply and extend the concept to new situations.		t im stedaile estino es a class form a bun	

Power Standard: Understand the Proper	rties of Circles
Learning Target	Self-Assessment
I can use the radius to find the diameter of a circle.	oger-Neat self-repor
I can use the diameter to find the radius of a circle.	swensinga easte end
I can explain the relationship between the diameter and circumference of a circle.	them follow these
I can explain why the formula, $C=$ diameter \times π works for finding the circumference of a circle.	Each See Cherry Company of the Compa
I can use the circumference to find the diameter of a circle.	Magna IV aleque
I can explain why the formula, $A = \text{radius}^2 \times \pi$ works for	raciu todovjete o 25. They m

3. Students identify and discuss their individual progress toward mastery of the objective.

IAM GOOD AT THESE!

Learning targets I got right: three temperature for the desire of the tright wint to conduct one or

I AM PRETTY GOOD AT THESE, BUT NEED TO DO A LITTLE REVIEW

Learning targets I got wrong because of a fixable mistake:

What I can do to keep this from happening again:

in a superior of the superior

I NEED TO KEEP LEARNING THESE About the proper "and" a new a lay Learning targets I got wrong and I'm not sure what to do to correct them:

tomercad pel and referring agent as experienced laurancement and income of the

that has come too soon. While students are still learning, it is me

sachre masser; When we use quiz results formatively to meet student

she were to receive a grade on this quiz. Lauren would likely get an i-

What I can do to get better at them: sanogalo blunda ow absent not sometimes

3. Students identify and discuss their individual progress toward mastery of the objective.

V	Pre	e-	Po	st-
Vocabulary	8	9	D	9
formula	417.19	ansenasia. Si		A CONTRACTOR OF THE PARTY OF TH
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linear equation		4-5	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
two-step equation	A STATE OF THE PARTY OF THE PAR	1 - 3		
work backward strategy	471	- F 14		
perimeter	10.00			1.27
area	1	14 4		Maria
variable			12 11 11	17
inverse Transfer Regularization	1	(P. 1)		105.0
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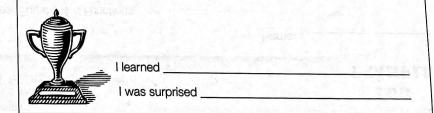
Pre-Assessment: Plan of Action

- 1. What is your specific learning target (weakness)?
- 2. What are two things you will make sure you do during the study of Ch. 3?
- 3. Who can help you along the way? When?
- 4. Will you prepare for your Ch3 test the same way you prepared for Ch2 test? Why or why not?

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Post-Assessment: Reflection

- 1. How did you prepare for this test? Did you follow your Plan of Action?
- 2. Did you reach your target?
- 3. What would you do differently?



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3. Students identify and discuss their individual progress toward mastery of the objective.

Stars and Stairs with a Developmental Continuum FOR EXAMPLE Learning Target: Narrate an event Date: I can add details to my picture that help explain Date: what happened. I can draw a picture that shows the beginning, Date: the middle, and the end of something I can draw a picture that happened. showing something that happened. in their work with symbols, such as stars and stairs, prior to

FVIDENCE

4. Students choose appropriate strategies and tools to support their own thinking.

50+ CRITICAL THINKING STRATEGIES FOR LEARNING



Interpret

Infer

Use the TeachThought Taxonomy

Separate cause and effect

Prioritize

Deconstruct

Reverse Engineer

Write

Reflect

Separate the subjective from the objective

Be vigilant in distinguishing beliefs and truths

Analyze underlying assumptions

Use formal and/or informal inquiry

Use the 5 Ws

Use spiral thinking

Concept-map

Illustrate what's known, currently unknown. and unknowable

Use Bloom's Taxonomy

Apply informed skepticism

Use question and statement stems

Explore the history of an idea, stance, social norm, etc. [especially change over time]

Debate

Analyze from multiple perspectives

Transfer

Be patience

Adopt the right mindset

Humility

Judge

Understand the relationship between beliefs, observations, and facts

See 'truth' in degrees/non-binary

Curiosity

Creativity

Explore the nature of thinking and belief (this sets the stage for long-term critical thinking)

Separate people from

Explain the significance

Challenge something

Predict and defend

Form a guestion, then improve that question before

Revise something

their ideas

gathering information

Revise a question after information/observation

Critique something

Observe something

Transfer a lesson or philosophical stance from one situation to another

Improve an existing idea

Compare and contrast two or more things

Test the validity of a model

Separate causes from symptoms

Identify the primary and secondary causes of a problem

Adapt something for something new

Make a prediction and observe what occurs

Narrate a seguence

Identify first truths

Study and visually demonstrate nuance

Identify and explain a pattern

Study the relationship between text and subtext

Elegantly emphasize nuance

Critically evaluate a socially accepted idea

Use model-based learning

Take and defend a position

Record notes during and after observation of something

Keep a thinking journal



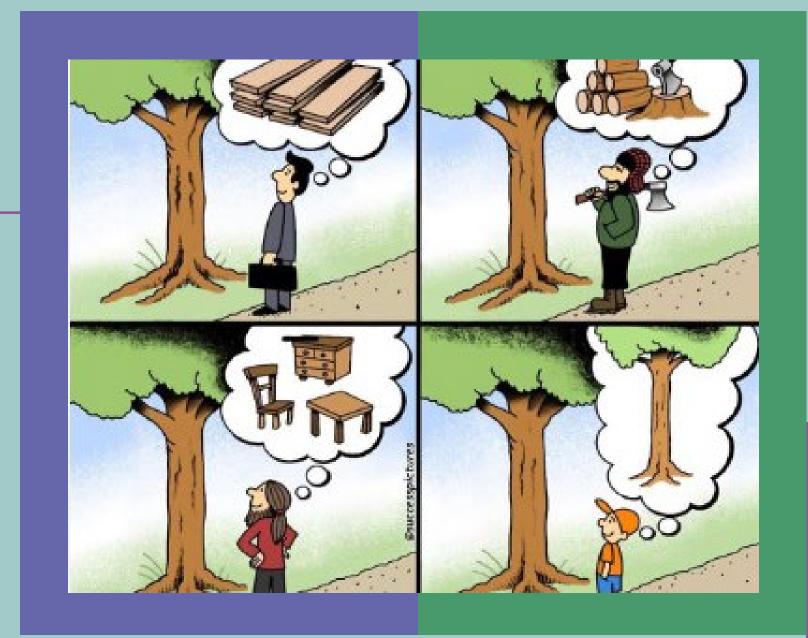


teachthought

4. Students choose appropriate strategies and tools to support their own thinking.



5. Students are aware of multiple aspects of a topic and consider different points of view and perspectives to problems and solutions.



6. Students are actively using success criteria and comparing it to their student work to check their progress toward mastery.

Self-Assessment Pretest Results

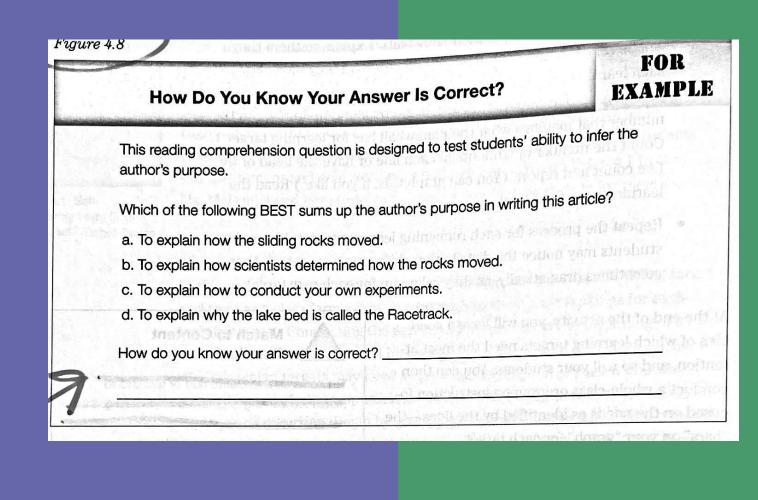
EXAMPLE

Fraction Study Targets:

- I will use factors to rewrite fractions in lowest terms.
- I will use common denominators to compare, order, add, and subtract fractions.
- I will use the relationship between fractions and mixed numbers to add, subtract, multiply, and divide fractions.

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action	aag hui	retest Resu			29 (1	113
Lesson Targets	# Right	# Wrong	Simple Errors	Not Yet	Part-Way	Got It
Fractions to lowest terms	Ana antao	general news	abunders	a trachinta d	HIW IN THE	in veri
Fraction multiplication	olos dirw	chievemen	ting their a	dem sistes	ets and are	pasti as
Fractions to mixed #	produced to the call the		est cencile	a destinan	Jiolis bas i	HIDI DE
Mixed # to fraction						
Order/compare fractions	2 3 6		ng - a haptor placement con the		g*min manage	e Service
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Mixed # multiplication	revied p	ur mix en eret dricke	you pess to	made off	an a nahai	Avari
Fraction/mixed # division	dag no fil	how they.	no hassil on	ranforba:	nich they n	and w

6. Students are actively using success criteria and comparing it to their student work to check their progress toward mastery.



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Reviewing My Results

		Date:
Name:	Assignment:	TAX 3 A 7 sensiti

Please look at your corrected test and mark whether each problem is right or wrong. Then look at the problems you got wrong and decide if you made a mistake you can fix without help. If you did, mark the "Fixable Mistake" column. For all the remaining problems you got wrong, mark the "Don't Get It" column.

Problem	Learning Target	Right	Wrong	Fixable Mistake	Don't Get It
1					
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3				The state of the s	
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5	Col. S	11.101	00Le	5.86.TF	1.61 2.67 2.12 2.0
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10	you the mild White	feeth if ask	ed through	il resortiff	

6. Students are actively using success criteria and comparing it to their student work to check their progress toward mastery.

did, mark the "Fixable Mistake" column. For all of the remaining problems you got wrong, mark the "Don't Get It" column.

Problem	Target barrang Target	Right	Wrong	Fixable Mistake	Don't Get It
idsq"	Identify elements of story—plot	l ha x ad l	ng etagra	WH THE	
2	Identify elements of story—setting	X	DIES , BALL	410	
3	Identify elements of story—characters	X		nestif i	
• 4	Identify elements of story—characters	508 X 820	1 du7/ .#	Las .	
5	Describe a character's actions based on textual evidence	r einer a is. 1708 Orli	CONTRACT	и с. X ЭПК	
6 41 15 54	Describe a character's thoughts based on textual evidence	751970	X	X	
7	Describe events based on textual evidence	ing routs	X X	X	
. 8	Recognize simple similes in context	X	de tre inc		
9 9	Recognize simple similes in context	Mark X	CASS OF THE STATE	Charles -	
10	Recognize metaphors in context	A X	Designation	N NOTE	
11	Recognize metaphors in context	A TOTAL CONTRACTOR	X	Care and a second	X
12	Explain the meaning of simple similes in context	X	l lizu ere s		

6. Students are actively using success criteria and comparing it to their student work to check their progress toward mastery.

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Reviewing and Analyzing My Results, Secondary Version

Name:	Assignment:	Date:
Namo:		

As you answer each question, decide whether you feel confident in your answer or are unsure about it and mark the corresponding box.

Problem #	Learning Target #	Confident	Unsure	Right	Wrong	Fixable Mistake	Don't Get It
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2	ADELIC LICEN CHOICE	CSI EXILI 90	a Monta (July Brazile	
3	hat eve neso discust	ish new nis		annet	ngo hra	with the st	
(4) the	- Anneason the for the	tarrest (Af)	J. prom. Tij	e (bem	be first ti	inerio Art	Carolin
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16	(u du'he powerin)	or strategic	(Latives to	elear t	rrens an	Administration	stand-

ANALYZING MY RESULTS

- After your test has been corrected, identify which problems you got right and which you got wrong by putting Xs in the "Right" and "Wrong" columns.
- Of the problems you got wrong, decide which ones were due to mistakes you can correct yourself and mark the "Fixable Mistake" column.
- 3. For all of the remaining wrong answers, mark the "Don't Get It" column.

talking with their peers and/or their teachers about the thinking strategies they are using to solve problems and why those strategies are beneficial.

Elementary P	Assessment Dialogue Form
Name:	Date:
Assignment:	Feedback Focus:
MY OPINION	
My strengths are	Mess scarre is included insulated that has been been as a factorial to the state of
What I think I need to work on is	and the second of the second o
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talking with their peers and/or their teachers about the thinking strategies they are using to solve problems and why those strategies are beneficial.

5. EFFECTIVE FEEDBACK LIMITS CORRECTIVES TO WHAT STUDENT CAN ACT ON

ASSESSMENT DIALOGUES -

TWO-COLOR HIGHLIGHTING

USE WITH A PERFORMANCE TASK AND RUBRIC

Two-Color Highlighting PROTOCOL

- 1. Students mark with yellow highlighter the phrases on the rubric they think describe their work.
- 2. After they highlight in yellow, the teacher highlights in blue the phrases that you believe describe it.
- 3. Where you and student agree, phrases become green. Phrases that remain yellow and blue represent areas that need to be discussed.

ANALYTICAL THINKING

where students analyze, compare and contrast, and evaluate and explain information

Example 1:

In language arts, a class read *Charlotte's Web*. The lesson began with a discussion of how readers can learn life lessons from different story characters. Through a Venn diagram, the class worked in small groups to compare and contrast Wilbur's personality traits with those of Charlotte.

Next, the teacher asked the students to analyze the text and find specific words that provided evidence of the character traits the student listed.

For the final part of this assignment, the teacher asked students to explain why Charlotte chose to help Wilbur and what each child would do if he or she were Charlotte.

ANALYTICAL THINKING

where students analyze, compare and contrast, and evaluate and explain information

Example 2:

Students studied a specific artist's work while working in pairs. They were asked to observe a painting, and each identify one thing in the painting or element of the painting that could be removed that would not alter the artist's intent.

Students discussed their choices and their responses with their partner and decided the best response to share with the whole class.

Students were also asked to explain what the painting revealed about the artist's attitude toward life, war, nature, or other concepts.

PRACTICAL THINKING

where students use, apply, and implement what they learn in real-life scenarios

Example 1:

A class engaged in a lesson on measurement. The teacher informed students that they will be building tree and plant boxes throughout the school. These planters will be various shapes and sizes and will require students to not only measure and cut different pieces of wood to build them, but also to estimate the sizes of the plants and bushes to put in them.

PRACTICAL THINKING

where students use, apply, and implement what they learn in real-life scenarios

Example 2:

A group of students, fed up with the cafeteria food, decided to do something about it.

First, they researched what the necessary requirements are for a healthy lunch.

Next, they designed a menu for two weeks.

Finally, they created the shopping list and pricing list to ensure that the lunches they are requesting are affordable.

After working through each of these issues, the students presented their menu, shopping list, and pricing list to the school board.

Their proposal was negotiated and some items on the menu changed.

CREATIVE THINKING

where students create, design, imagine, and suppose

The following are types of activities a teacher could present to her students that would showcase this descriptor:

- Design a food chain with imaginary animals. Provide a rationale for where each animal fits.
- Create a survey to determine the favorite food of students in your school.
- Design a new playground for the school and make sure your drawing is to scale.
- Rewrite the Bill of Rights.
- Create a classroom constitution.
- Create a three-dimensional map of their state.
- Suppose George Washington was never born. Write about what America might be like today without him.
- Create a song or develop new words for an existing melody.
- Design a new football or basketball play for PE.

RESEARCH-BASED THINKING

where students explore and review a variety of ideas, models, and solutions to problems The following are types of activities a teacher could present to her students that would showcase this descriptor:

- Students in a social studies class research six different professions and describe the benefits and pitfalls of each.
- Students in a science class research three sources of alternative energy and, based on their analysis of each, recommend the most fruitful source.
- Students in a social studies class examine staple foods from countries in three different continents, and describe why those foods are so pervasive.
- During a study of Jim Crow laws, students also conduct a study of Civil Rights laws. They then compare and contrast the different types of laws, debate the need for present laws to ensure all citizens have equal rights, and create the wording for these laws.

THE TEACHER AND/OR STUDENTS MODEL METACOGNITIVE STRATEGIES.

Teachers and students make their thinking visible in the classroom when they model metacognitive strategies, opening their brains up for others to see the steps of their thinking process. Metacognitive models can support students in their own thinking processes.

Example 1:

During a high school English language arts lesson, students used a graphic organizer to analyze inferences of a poem and used the inferences to identify the theme of the poem.

To support students' engagement in this analytical thinking, the teacher modeled his thinking and completed the graphic organizer with a different poem than the students are using for their work.

Students had the opportunity to discuss how they completed their assignment with one another according to the success criteria that they codeveloped with the teacher at the start of the lesson.

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Example 2:

Students in a 3rd grade math lesson worked in groups of three to solve real-world problems using multiplication.

In a previous lesson, the teacher modeled different strategies to use to solve such problems.

Each of the three students used a different strategy to solve the problem: array, number line, and drawing a picture model.

Students discussed in their groups how they solved the problem using their assigned strategy and how each type of strategy helped them to do so.

GENERATE A VARIETY OF IDEAS AND ALTERNATIVES

Generating a variety of ideas and alternatives about a particular topic allows students to consider a topic in multiple ways, thereby leading to deeper understanding.

Example 1:

Before a unit on deserts, students list all of the plants, animals, and attributes of a desert they can identify.

Example 2:

When solving a fraction problem, students generate different ways to solve the problem and different ways to represent their answers.

Example 3:

Students in a science class conduct experiments about which variables lead to maximum plant growth. One group tests different types of light, one tests different types of liquid, one tests different types of soil, and one combines what students hypothesize to be the best of each. In this example, students not only generate ideas about what variables to test but also consider many alternative explanations.

ANALYZE PROBLEMS FROM MULTIPLE PERSPECTIVES AND VIEWPOINTS

Providing opportunities for students to consider multiple perspectives and viewpoints gives them the thinking they need to learn how those different from themselves may view problems and solutions.

Example 1:

A social studies class studies the Civil War by reading letters from soldiers from the North and South.

Example 2:

An art class studies predominant symbols in Western art and Eastern art and compares and contrasts the two art forms.

Example 3:

A physical education and math class work together to conduct a survey on children's favorite sports. Then, the students analyze data by grade level, gender, and race. They also discuss the factors affecting the data to further develop their understanding of the similarities and differences between grades, gender, and race.