Metacognitive Strategies

Lesson Four

Reading Task

Reading a passage and our minds wander from the pages. We see the words but no meaning is being produced. Suddenly we realize that we are not concentrating and that we've lost contact with the meaning of the text. How do we recover?

The inner awareness and the strategy of recovery are components of metacognition.

What do you do? Who taught you to do those things?

Capacities of a Literate Individual

1. They **demonstrate independence**.
2. They **build** strong **content knowledge**.
3. They **respond** to the **varying demands** of audience, **task**, purpose, and discipline.
4. They **comprehend** as well as **critique.**
5. They **value evidence.**
6. They **use technology** and digital media strategically and capably.
7. They come to **understand other perspectives** and cultures.

(National Institute of Child Health and Human Development, 2000),

- Effectiveness of systematic direct instruction of multiple **metacognitive strategies designed to assist students in comprehending of expository text and vocabulary.**
- Binomial Effect Size Display

40% difference in gains in **vocabulary** between the two groups and a 20% difference in gains in **reading comprehension in just five weeks**.

Visible Learning For Teaching

John Hattie rank orders factors that have the greatest effect size in student achievement.

Meta-cognitive strategies taught and used have an effect size of .69

How do we teach students to use metacognition?

Teach the Metacognitive Process:

Plan for thinking

- Clear about the task
- Determine strategies: graphic organizer, take notes, draw a picture or diagram, identify what you already know
- Set goals
- Determine a sequence
- Set deadlines
- Identify possible distract actions
- Determine how to overcome distractions

Metacognitive Process:

Monitor and adjust plan: Am I

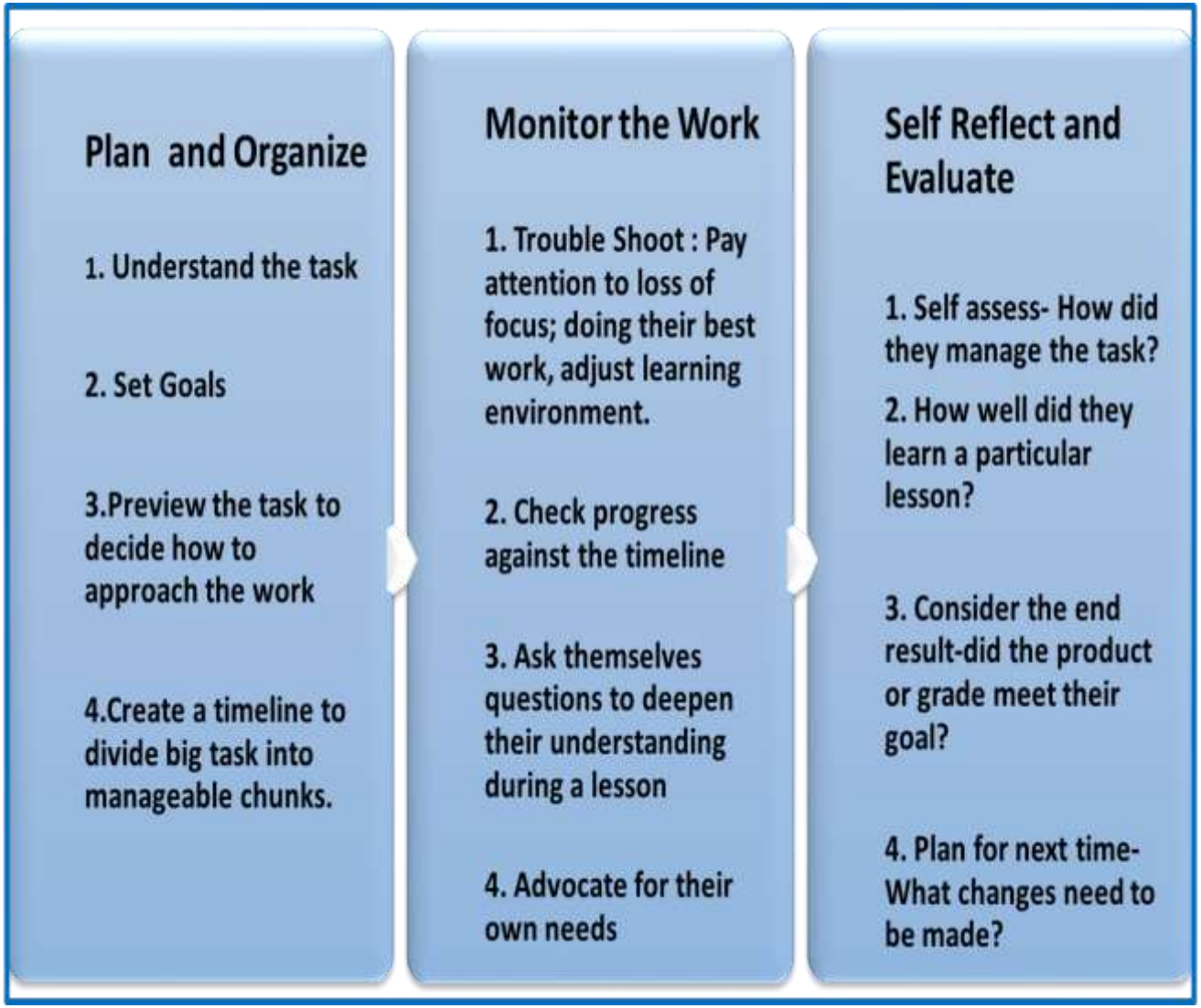
- making progress on the task
- thinking about the learning and identify the problem
- comprehending what I read or is said and identify the problem if you are not
- making adjusts to help me

Metacognitive Process:

Self Reflect and Evaluate : How well did I

- accomplish my task
- manage my time
- stay on task
- use strategies to help me

Behaviors and Disposition of Successful Student Using Metacognitive Strategies



College and Career Anchor Standard for Reading 1

Read closely to determine what the **text says explicitly** and to make **logical inferences** from it; **cite specific textual evidence** when writing or speaking to **support conclusions** drawn **from the text.**

How to Do a Close Read of a Text

essay, newspaper or magazine article, journal, speech, poem, short story, political cartoon, primary source document, photo, graph, chart

Close Read Steps

DRAFT

1. Understand why the text is being read.
   - What is my purpose for reading?
   - What question am I to answer?
2. Read the text.
3. Summarize the text (what is this about?)
   - Share your thinking with a partner to enhance understanding
4. Reread the text
   - Identify words or phrases that you don't understand
   - Find patterns - words, statements, contradictions
   - Identify things that strike you as unusual, unexpected, or important
   - Write questions that you have about a sentence or phrase
5. Answer questions from the text.
   - Cite your evidence from the text
6. Demonstrate knowledge from the text.
   - Write, compare/contrast content to multiple text, or verbally communicate learning from the text

Process Steps support Metacogniti on

Metacognitive Reading Awareness Inventory

For each question, check as many responses as you think are effective.

1. What do you do if you encounter a word and you don't know what it means?
   - ☐ a. Use the words around it to figure it out.
   - ☐ b. Use an outside source, such as a dictionary or expert.
   - ☐ c. Temporarily ignore it and wait for clarification.
   - ☐ d. Sound it out.

2. What do you do if you don't know what an entire sentence means?
   - ☐ a. Read it again.
   - ☐ b. Sound out all the difficult words.
   - ☐ c. Think about the other sentences in the paragraph.
   - ☐ d. Disregard it completely.

3. If you are reading social studies material, what would you do to remember the important information you've read?
   - ☐ a. Skip parts you don't understand.
   - ☐ b. Ask yourself questions about the information ideas.
   - ☐ c. Realize you need to remember one point rather than another.
   - ☐ d. Relate it to something you already know.

4. Before you start to read, what kind of plans do you make to help you read better?
   - ☐ a. No specific plan is needed; just start reading toward completion of the assignment.
   - ☐ b. Think about what you know about the subject.
   - ☐ c. Think about why you are reading.

Standards for Mathematical Practice

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

Make sense of problems and persevere in solving them. Mathematical Practice 1

When presented with a problem, I can make a plan, carry out my plan, and check its success.

BEFORE...

EXPLAIN the problem to myself.

MAKE A PLAN to solve the problem

- *What is the question?*
- *What do I know?*
- *What do I need to find out?*
- *What tools/strategies will I use?*

DURING...

PERSEVERE (Stick to it!)

MONITOR my work

ASK myself, "Does this make sense?"

CHANGE my plan if it isn't working out

AFTER...

CHECK

- *Is my answer correct?*
- *How do my representations connect to my solution?*

EVALUATE

- *What worked/didn't work?*
- *How was my solution similar or different from my classmates'?*

Metacognition: Student Guide

METACOGNITION consists of three basic elements:

- Developing a plan of action
- Maintaining/monitoring the plan
- Evaluating the plan

Before - When you are developing the plan of action, ask yourself:

- What in my prior knowledge will help me with this particular task?
- In what direction do I want my thinking to take me?
- What should I do first?

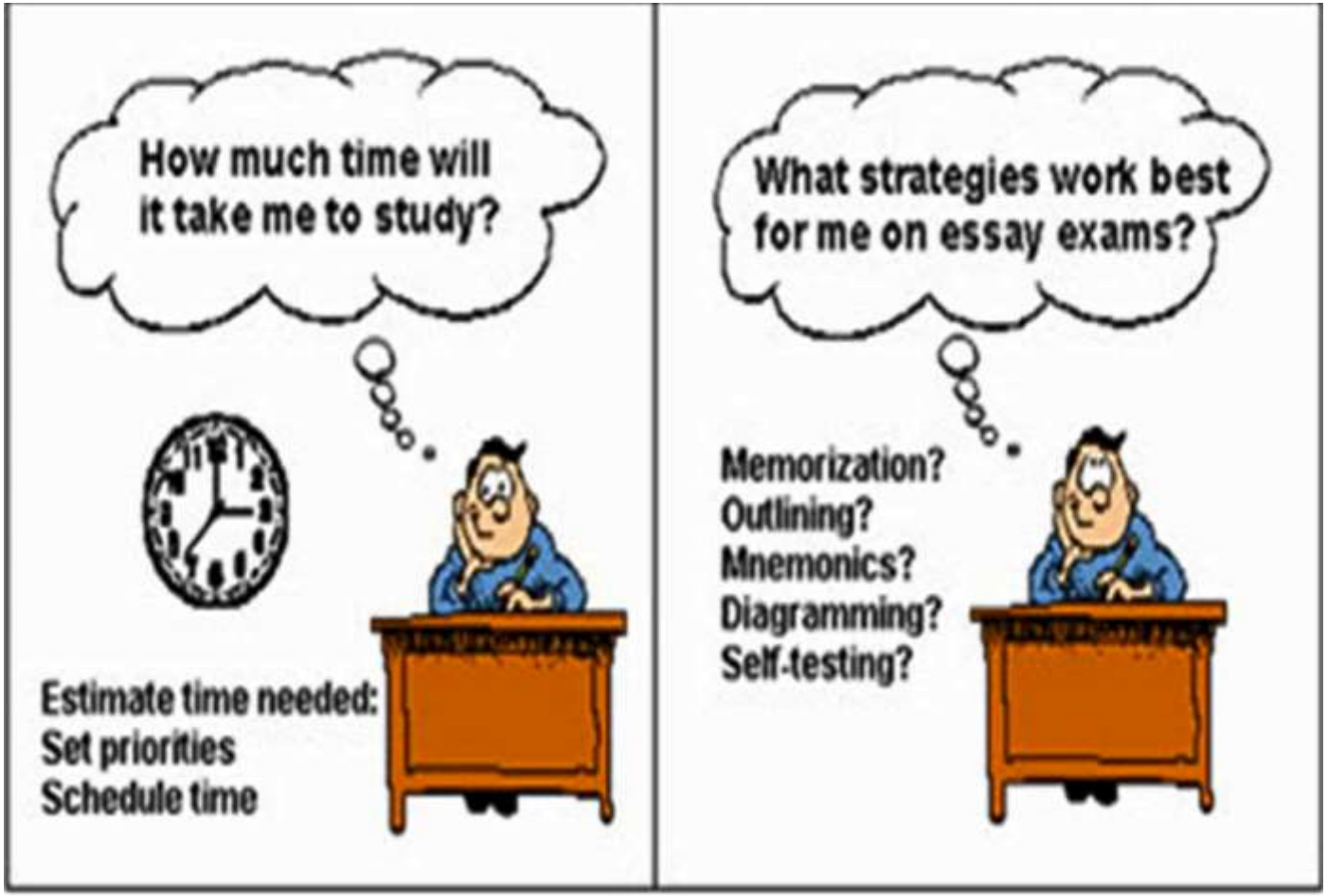
During - When you are maintaining/monitoring the plan of action, ask yourself:

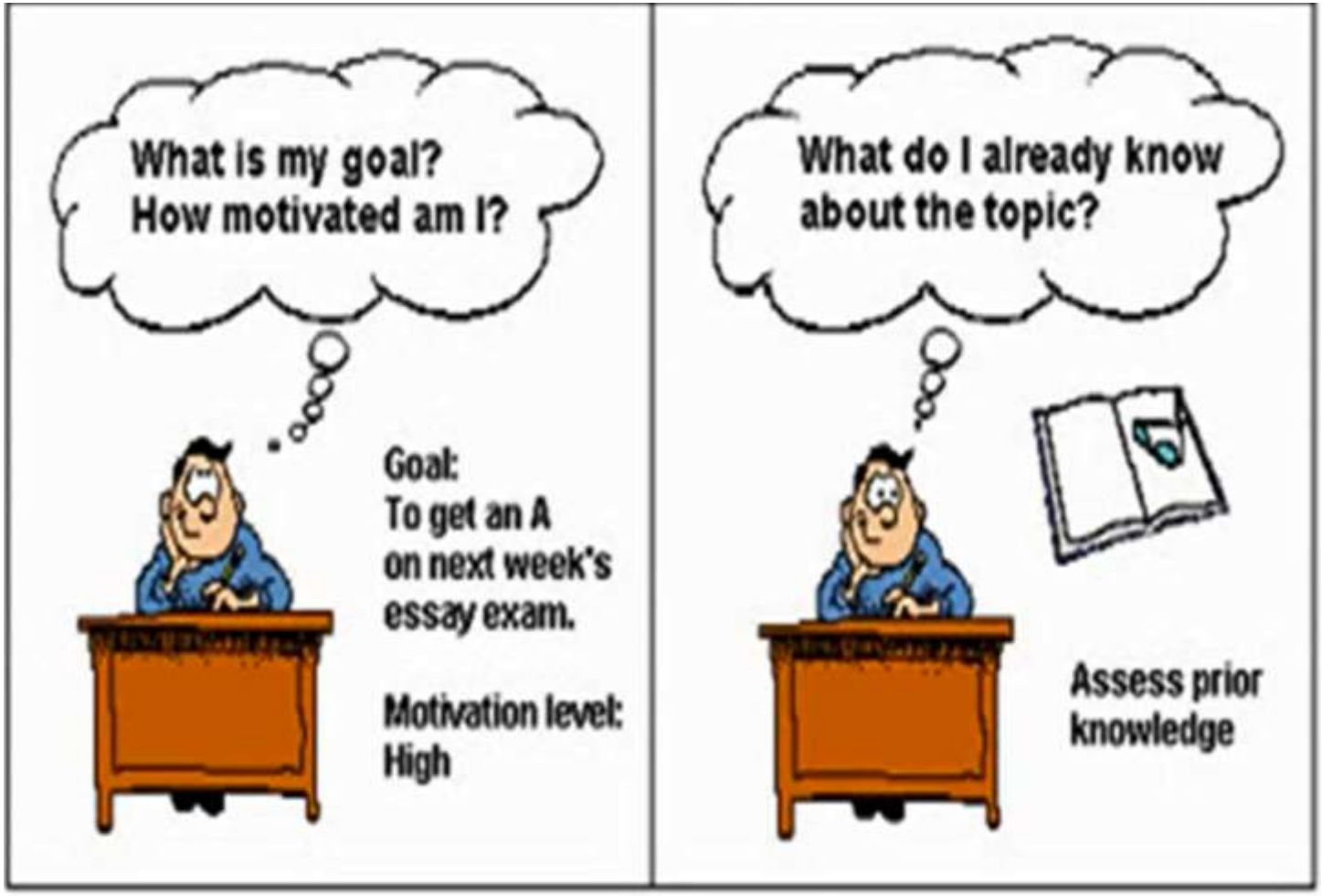
- How am I doing?
- Am I on the right track?
- How should I proceed?
- What information is important to remember?

After - When you are evaluating the plan of action ask yourself:

- How well did I do?
- Did my particular course of thinking produce more or less than I had expected?
- What could I have done differently?

Preparing for an exam




What is my goal?
How motivated am I?
Goal:
To get an A
on next week's
essay exam.
Motivation level:
High
What do I already know
about the topic?
Assess prior
knowledge

As with the first exam, this activity is designed to give you a chance to reflect on your exam performance and, more importantly, on the effectiveness of your exam preparation. Again, please answer the questions sincerely. Your responses will be collected to inform the instructional team; they will have no impact on your grade.

1. Approximately how much time did you spend preparing for this exam? _____

2. What percentage of your test-preparation time was spent in each of these activities?
   a. Reading textbook section(s) for the first time _____
   b. Re-reading textbook section(s) _____
   c. Reviewing homework solutions _____
   d. Solving problems for practice _____
   e. Reviewing your own notes _____
   f. Reviewing materials from blackboard _____
      (What materials? _____)
   g. Other _____
      (Please specify: _____)

3. What aspect(s) of your preparation for this exam seemed different from your exam 1 preparation? Did these changes have any effect?

4. Now that you have looked over your graded exam, estimate the percentage of points you lost due to each of the following (make sure the percentages add up to 100):
   a. Trouble with vectors and vector notation _____
   b. Algebra or arithmetic errors _____
   c. Problem with force-body diagram _____
   d. Lack of understanding of the concept _____
   e. Not knowing how to approach the problem _____
   f. Careless mistakes _____
   g. Other _____
      (Please specify: _____)

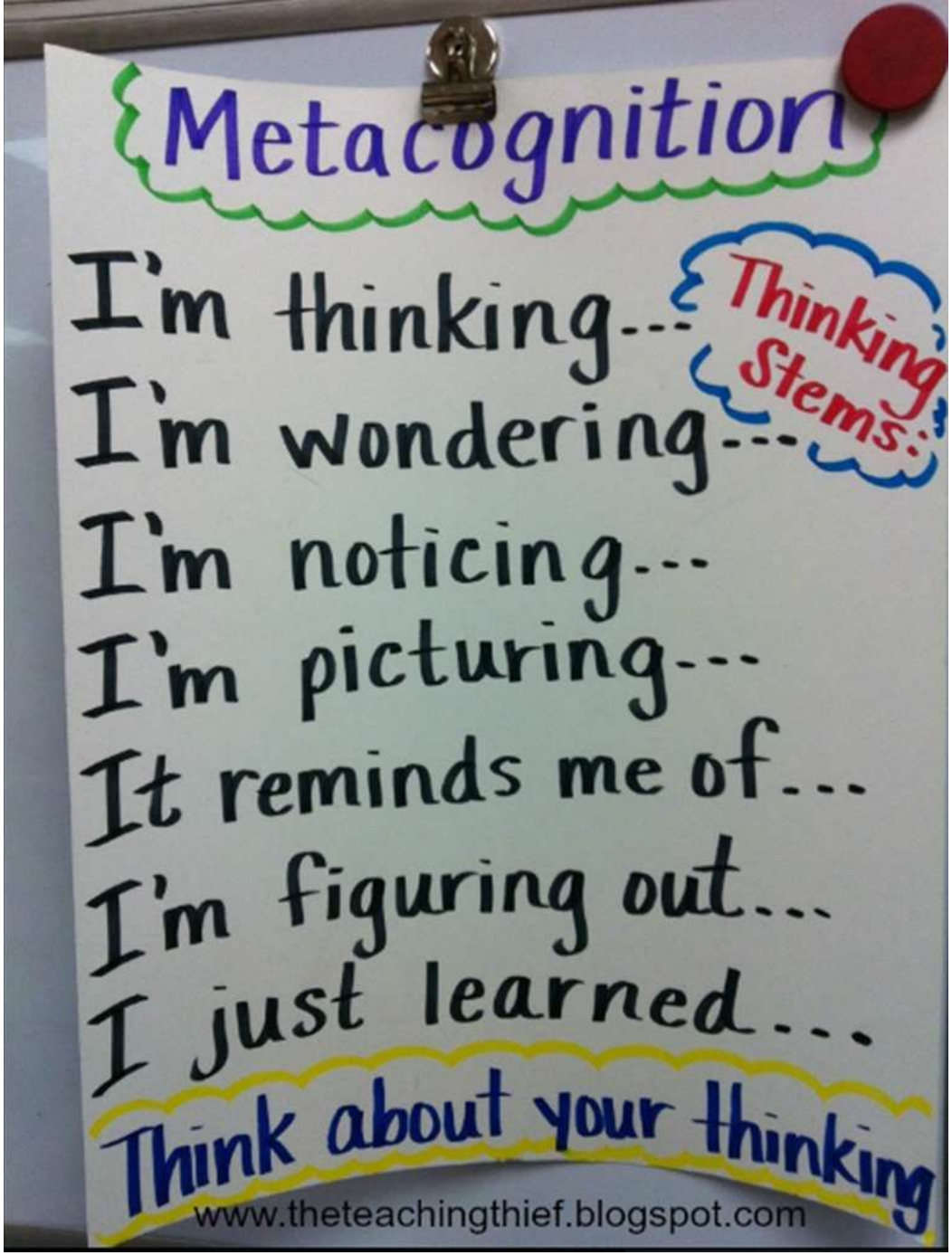
5. Students sometimes have difficulty drawing appropriate force-body diagrams and applying Newton's second law appropriately. Was either of these a difficulty for you (check question 2 on the exam)? If so, try to self-assess your understanding: Identify what aspect of these skills

Post- Exam Reflection of Exam Preparation

Direct Instruction of Strategies

Many researchers have tried to foster better metacognition and comprehension through direct instruction of strategies (Paris, Wasik, & Turner, 1991).

What can teachers do?


Metacognition
Thinking Stems:
I'm thinking---
I'm wondering---
I'm noticing---
I'm picturing---
It reminds me of...
I'm figuring out...
I just learned...
Think about your thinking
www.theteachingthief.blogspot.com

Metacognitive strategies

Teacher action that prepares students for learning or elaboration through self-reflection regarding what was learned.

- Teacher modeling of problem solving steps
- Think-pair-share
- Goal setting
- Journal Writing
- Activation of Prior Knowledge
- Cues and Questions

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, 34,* 906-911.

Metacognitive Strategies

- Brainstorming
- Webbing
- Task-specific graphic organizers
- Think Aloud Problem Solving--Self-questioning
- Debate
- Role Play
- Story map
- Story retelling
- Story frame
- Semantic mapping

Graphic Organizers

A graphic organizer for students to use as they are doing a project (KWL)

K What I Know	W What I Want to Learn	L What I Have Learned

Student Metacognitive Strategies

Which statement best describes you? Assess yourself.

I am a Novice

- I am just starting to learn this and I don't really understand it yet.

I am an Apprentice

- I am starting to get it, but I still need someone to coach me through it.

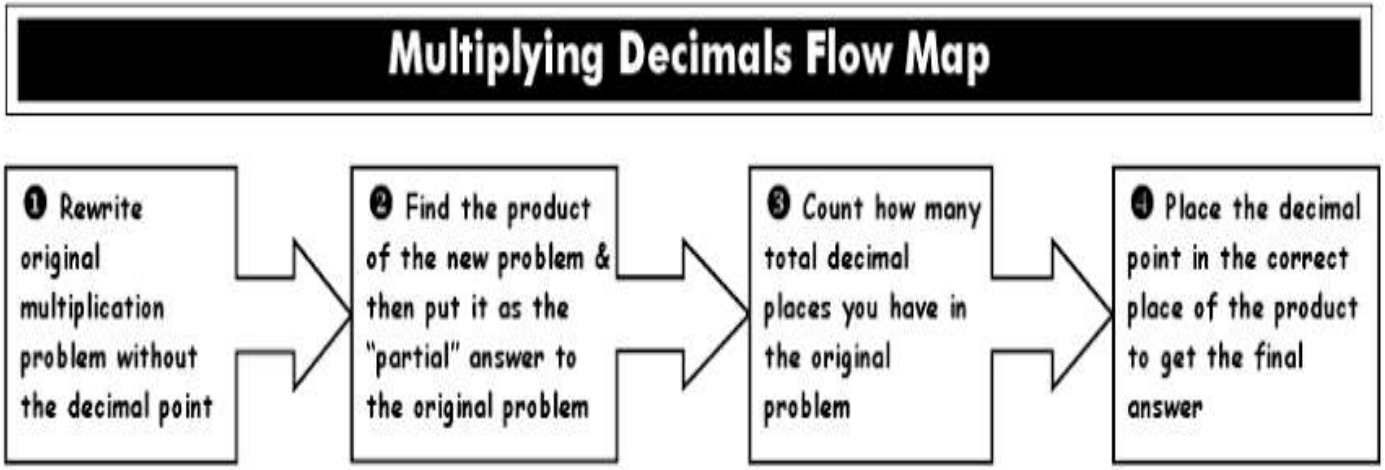
I am a Practitioner

- I can mostly do it myself, but I sometime mess up or get stuck.

I am an Expert

- I understand it well and I could thoroughly teach it to someone else.

Thinking Maps



Tree Map

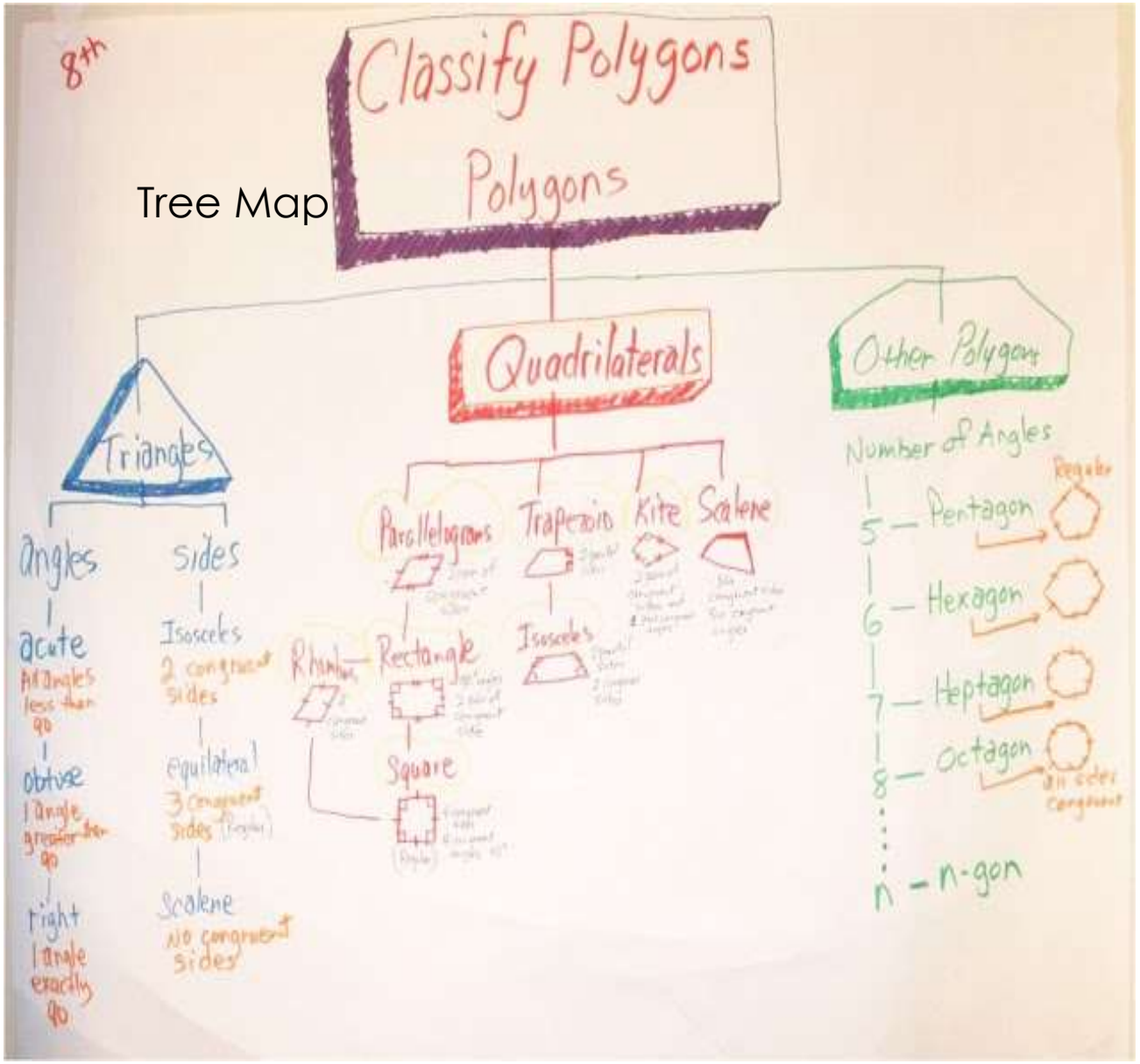

8th
Classify Polygons
Polygons
Quadrilaterals
Other Polygons
Triangles
Angles
Sides
acute
All angles less than 90
obtuse
1 angle greater than 90
right
1 angle exactly 90
Isosceles
2 congruent sides
equilateral
3 congruent sides
Scalene
no congruent sides
Parallelograms
Trapezoid
Kite
Scalene
Rhombus
Rectangle
Square
Isosceles
Number of Angles
5 — Pentagon
Regular
6 — Hexagon
7 — Heptagon
8 — Octagon
all sides congruent
n — n-gon

Figure 2
The Multiple Meaning Web Displays the Many Meanings of a Word

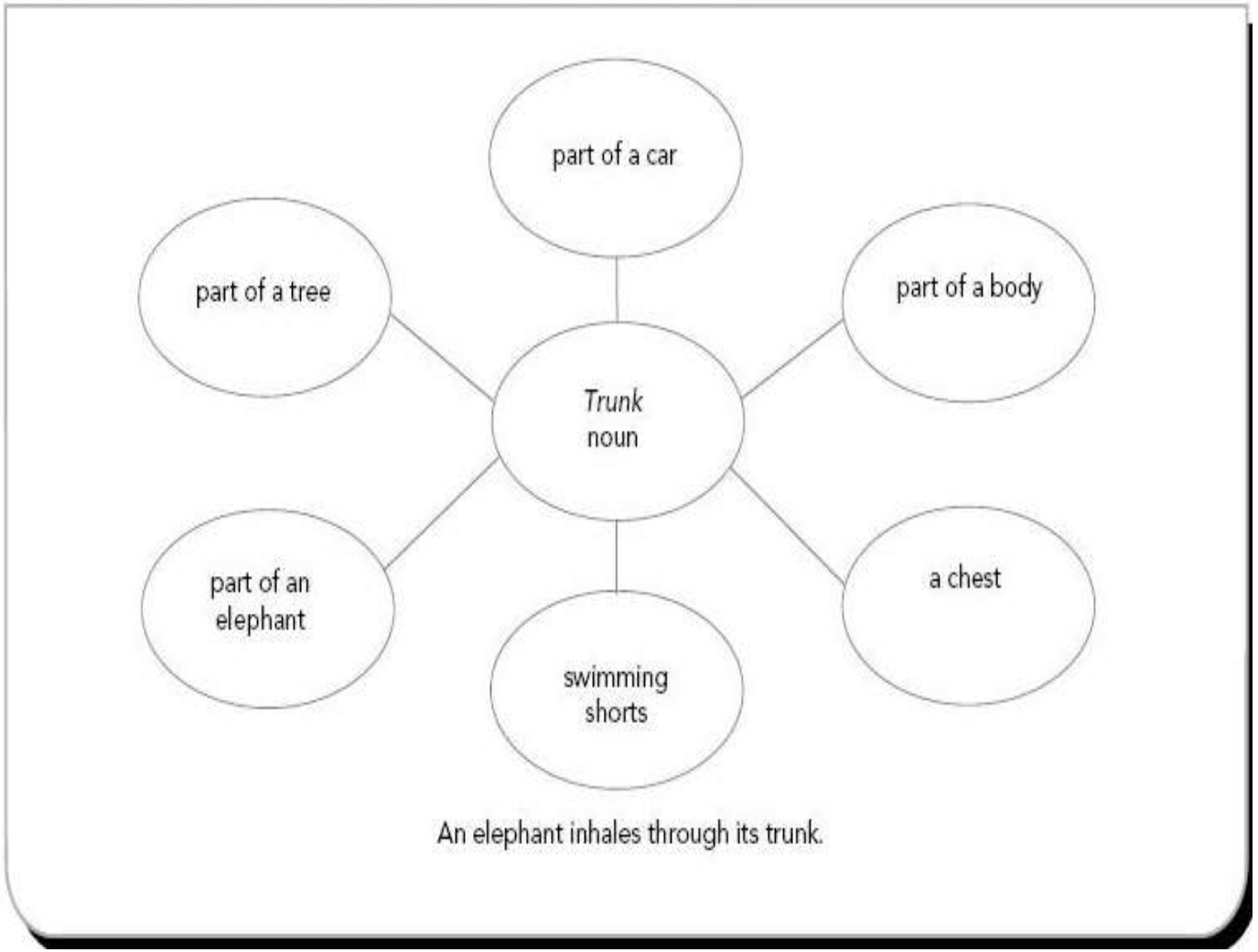
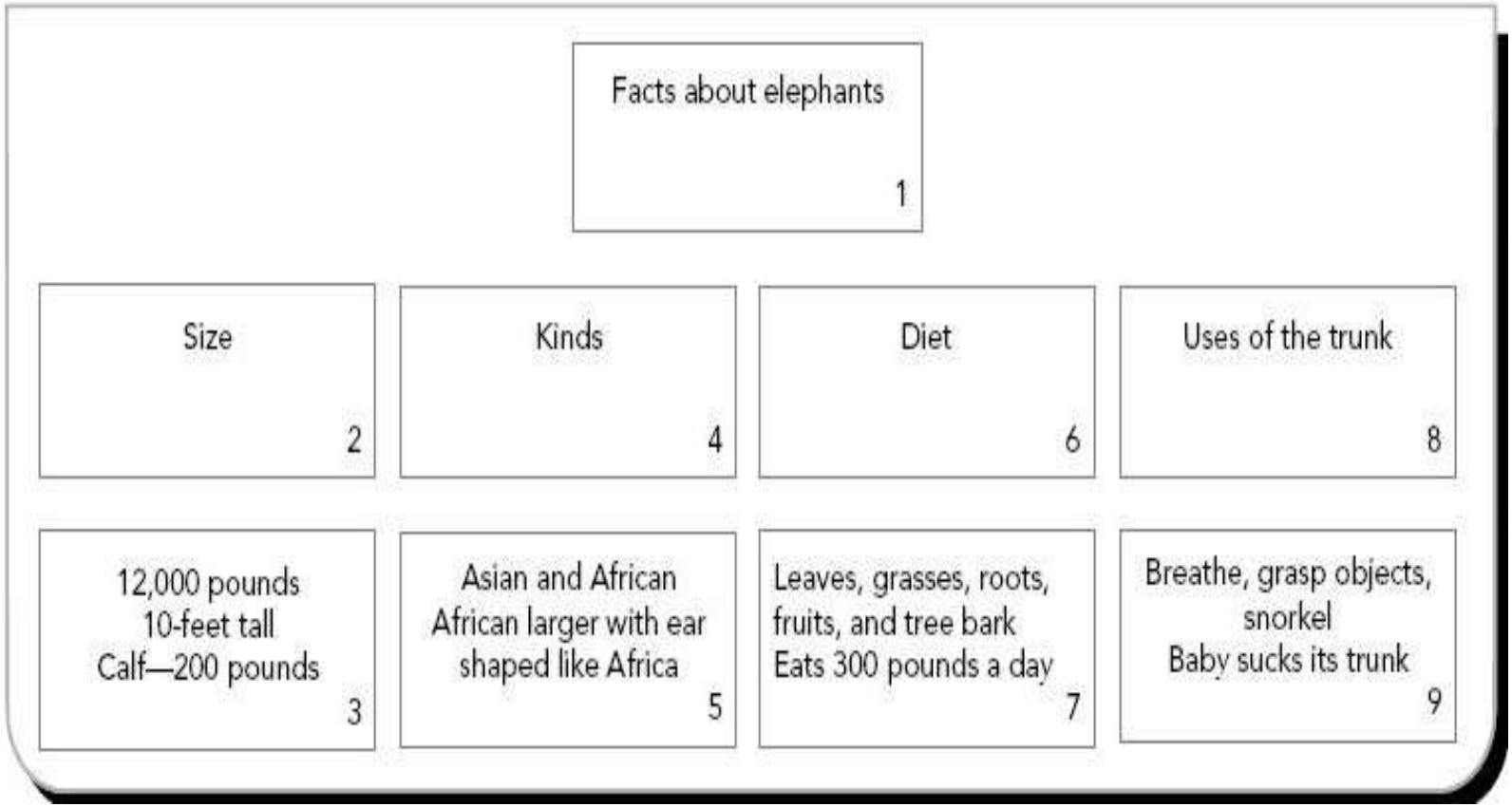


Figure 3
The Card Pyramid Summarized the Main Idea, the Supporting Ideas, and the Details



Think A loud

One of the most effective way to teach metacognitive strategies is the **think-aloud**.

This involves teacher talking the class through his/her thinking as he/she tackles a task, like a piece of text with new vocabulary or a new math concept.

Modeling Metacognition with Students

Predict

- What do the pictures tell me about what I will read?
- What do the heading tell me about what I will read?
- What do I predict is the author's purpose?

Summarize

- So far, I know this about what I read:
- I think I will read more about _____ as I continue to read.
- I think what might happen next in this text is ….

Connect

- Does this remind me of something I already know?
- How does this fit into what I already read so far?

Modeling Metacognition with Students

Clarify

- I didn't understand …. , so I reread, figured it out, and read on and now I know what it means /how it connects.

Visualize

The main thing I see on the page is ….

- I can draw or represent this concept in another way that makes sense to me.

Modeling Metacognition with Students

Question

- I am wondering about
- I need someone to help me understand…
- Something I will ask my teacher or another student to clarify is….

Evaluate

- As a result of reading, I know these three things about what I read.
- As a result of taking notes, I can explain these concepts.

THINK ALOUD
PROBLEM SOLVING

Pose challenging problems then:

Invite students to describe their plans and strategies for solving the problem.

Share their thinking as they are implementing their plan.

Reflect on/evaluate the effectiveness of their strategy.

- http://ww…UY
  O9Ve6Tai…

Cooperative Learning

Cooperative leaning is an effective method for metacognitive exchanges as students discuss and interact in a shared reading environment. It provides opportunities to reduce anxiety, and provide positive support among peers. (Paris et al., 1990; 1991).

Teacher Questioning: prompt students to think about their task and how they're doing

1. Describe what kind of thinking you did
2. Describe how you did your thinking
3. Evaluate your thinking
4. Check for accuracy
5. Data Gathering Questions
6. Reflective and Reasoning Questions

adapted from Schwartz & Parks (1994)

Metacognitive Thinking Questions

Student Statement	**Teacher Response**
The answer is 36 dollars, 7 cents	"Describe the steps you took to arrive at that answer."
I am comparing…	"What goes on in your head when you compare?"
I am ready to begin writing	"Describe your plan of action."

USD #449 Innovation Configuration Matrix--Metacognition

The teacher provides opportunities for students to be metacognitive.				
Component 1: The teacher models metacognition.				
1	**2**	**3**	**4**	**5**
The teacher does not model, demonstrate, or encourage metacognition during instruction.	The teacher tells students about metacognition and encourages its use rather than modeling through examples of concrete experiences, discussion, or reflection.		The teacher uses examples of concrete experiences, collaborative discussion and reflection related to understanding of content to model **metacognitive processes**.	The teacher models the process of **metacognition** by using student work to think aloud about what the **learning goal** is, where the student is in relation to the goal, and what the student can do to move forward.
Component 2: The teacher provides guided practice for students to demonstrate metacognition.				
1	**2**	**3**	**4**	**5**
The teacher does not provide time for students to use metacognitive processes to reflect on what and how they learn.	The teacher asks questions related to recall of critical content and relies on direct explanations rather than scaffolding opportunities for students to practice metacognition and attain conceptual understanding.	The teacher asks question to encourage students' self reflections but questions are not specific to promote metacognition.	The teacher uses questioning and feedback to provide opportunities for students to practice the use of metacognitive processes to reflect on what and how they learn.	The teacher provides concrete opportunities during the lesson for students to **reflect on their learning** (e.g., exit cards) The teacher asks questions that prompt students to consider how they solved problems, why they accepted or rejected ideas, and how they might solve the problem differently the next time.
Component 3: The teacher provides students with adequate time to practice metacogtion independently.				
1	**2**	**3**	**4**	**5**
The teacher does not provide time for students to process or act on their self-reflection.		The teacher provides inadequate time for students to process or act on their self-reflection.		The teacher provides **adequate time** for students to use these prompts to reflect on what and how they learn.

USD #449 Innovation Configuration Matrix--Metacognition

The student demonstrates and uses metacognitive processes.

Component 1: The students are taught metacognitive processes.

1	2	3	4	5
Students have not been taught what metacognition means.	Students have been taught what metacognition means.	Students have been taught metacognitive processes/strategies.	Students comprehend metacognition and with prompting and support select appropriate strategies to use in their learning.	Students comprehend metacognition and independently select appropriate strategies to use in their learning.

Component 2: The students demonstrate metacognitive processes.

1	2	3	4	5
Students do not demonstrate the use of self reflection on what and how they learn.	Students copy metacognitive processes but are unable to personalize or apply metacognition to deepen their self knowledge to enhance or take control of their learning.		Students demonstrate understanding of metacognitive strategies and with the aid of teacher prompts and cues, are able to self reflect on what and how they learn. With teacher support, students communicate personal learning strategies, set learning goals, and monitor their progress.	Students demonstrate understanding of self reflection by taking control of their own learning. They communicate **personal learning strategies**, set learning goals, and monitor their progress in achieving them.

Strategies:

*TAPS—Think Aloud Problem Solving
*Brainstorming
*Thinking Maps
*Think Pair Share
*Journal Writing
*Task Specific Graphic Organizer
*Jig Saw
*Exit Cards
*Mnemonics

Evaluate the Curriculum: What kinds of thinking did your curriculum unit require?

- How did you encourage your students' thinking about their thinking?
- Did you include ways for students to regulate and monitor their own learning in your plans? For example, were students asked to articulate their learning process and what they had learned?
- Did students share strategies and solutions with each other?
- Did students have opportunities for revision and for self- or peer assessment?
- What aspects of the unfolding events increased or decreased the opportunity for students to reflect on and regulate their learning in this learning event?
- How do you think this may have influenced what occurred?