

Designing Instruction: Using Principles From Research on Cognition

Infusing Thinking and Metacognition
into Instructional Design

T-543 Session 9

Announcements

- Draft- Saturday night at midnight/ Cover Sheet to indicate input from TG now or later.
- Lesson Planning Packet of Examples for infusing transfer, metacognition, pictures of practice, etc. on-line.
- Lunch today
- Film Crew
- SRC
- Rubric - “T543 Principles”

Preview of Class

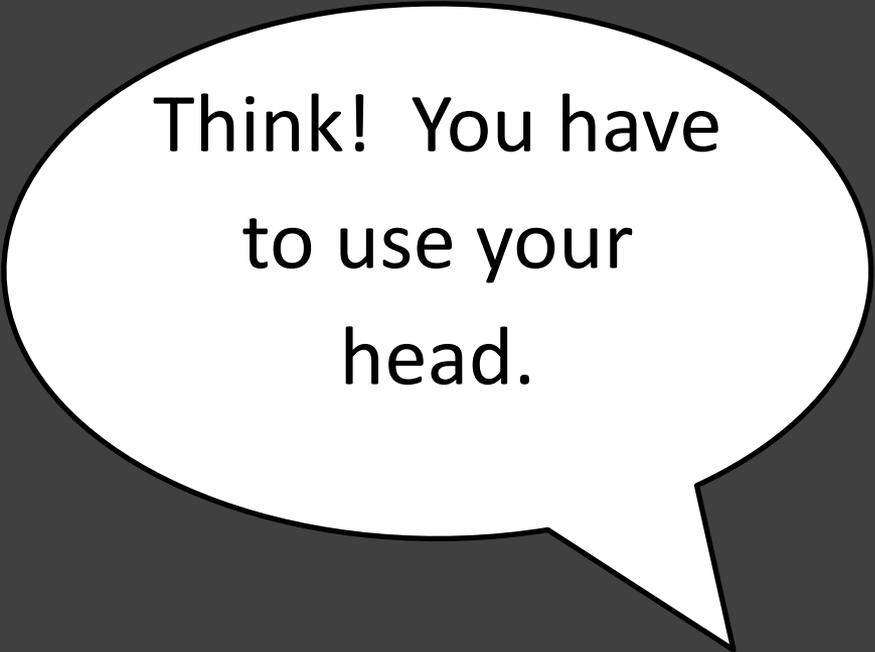
- Experiencing/Reflecting Upon Thinking and Metacognition (Reflection; Group Experience; Pair Share; Large Group Sharing)
- Developmental Perspective; A Brief History of the Teaching of Thinking/Metacognition (Mini-Lecture)
- What does the Research Say? (Small Group Jigsaw Discussion/Headlines and Questions)
- Break
- What Does it Look Like in Practice?: Analyzing Two Video Examples (Small Group Discussion/Headlines)
- Examples on line to explore outside of class...
- Connecting Forward for Section: Integrating Metacognition into your Projects

Recollect some of your own
experiences as a learner...

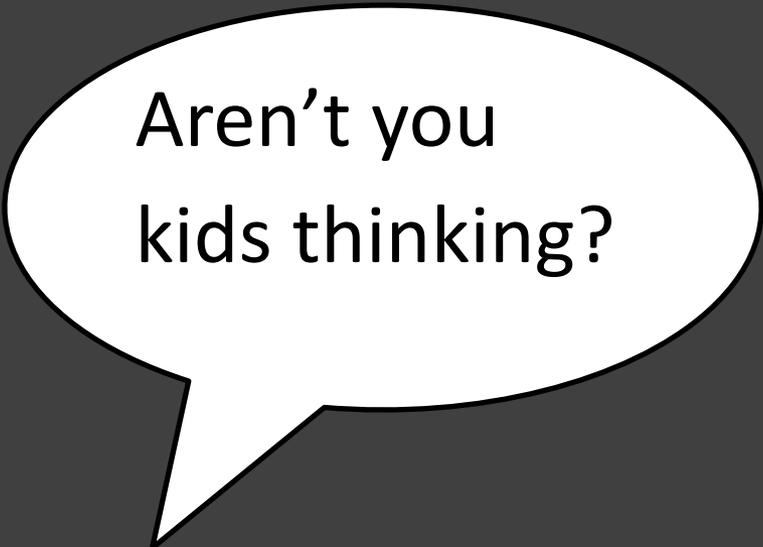
What are some of the messages that
you recall hearing about thinking?

A white speech bubble with a black outline and a tail pointing towards the bottom-left. It contains the text: "Go back and think about this some more."

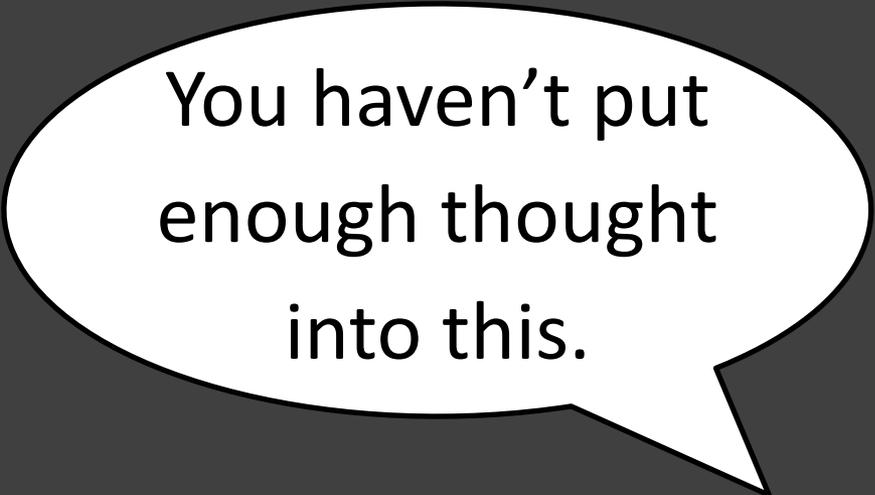
Go back and
think about this
some more.

A white speech bubble with a black outline and a tail pointing towards the bottom-right. It contains the text: "Think! You have to use your head."

Think! You have
to use your
head.

A white speech bubble with a black outline and a tail pointing towards the bottom-left. It contains the text: "Aren't you kids thinking?"

Aren't you
kids thinking?

A white speech bubble with a black outline and a tail pointing towards the bottom-right. It contains the text: "You haven't put enough thought into this."

You haven't put
enough thought
into this.

Shared Experience on Thinking and Metacognition

Watch the film and try to make sense of what you are seeing. As you do, also pay attention to the patterns in your thinking. How does it shift and change? Are there places where your thinking gets stuck?

Reflect on the processes of your thinking and evaluate those processes while you watch...

Reflections?

- What was your thinking like at different points in the film?
- How were you able to manage the process of thinking about what you saw and thinking about your thinking?
- How would you describe your affect at different points in the experience?

From the Stance of Developmental Psychology and Cognitive Science: Learning About Our Own and Others' Minds

- Theory of Mind Research
- Cognitive Load
- Executive Functioning Research

Some Challenges for Learners: You can't see thinking...

- More than looking like you are thinking
- A “force and focus” conception
- Lack of understanding of the task
 - Reading for comprehension
- Lack of strategies
 - Knowing what good thinkers do
- Cognitive load

A Brief Look at the History of Teaching Thinking and Metacognition

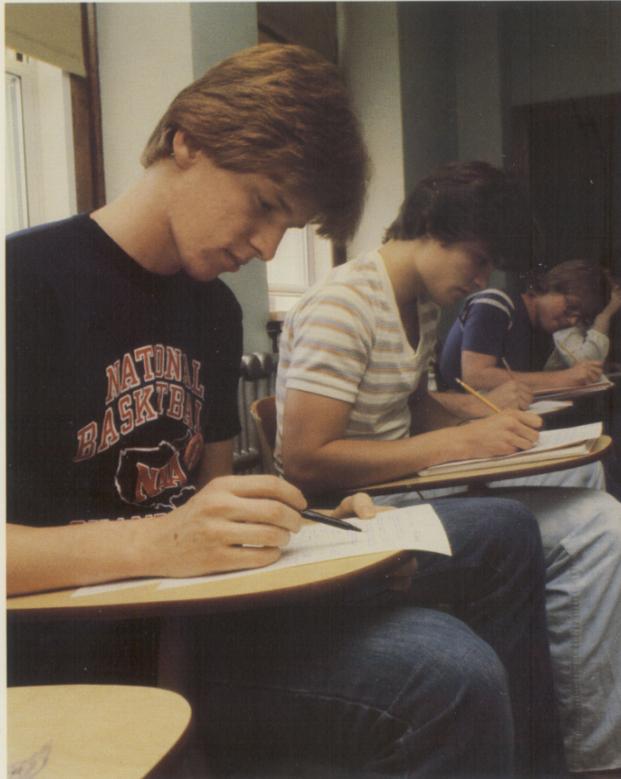
The Teaching of Embedded Thinking (without particular attention to dis-embedding it)

Classifying

- Thinking About Tests

In, Out, and Around Tests

9



Work with a friend on this activity. Talk together and make up a list of every reason you can think of for using tests in school. (Can you think of ten reasons? Twenty-five? Thirty?)

Then, arrange the items on your list into groups.

Identifying Assumptions

• Mathematics

Measuring and Weighing

19

The coach measured William's height. Then he looked at his records and said, "I see you've grown three inches since last year, William."

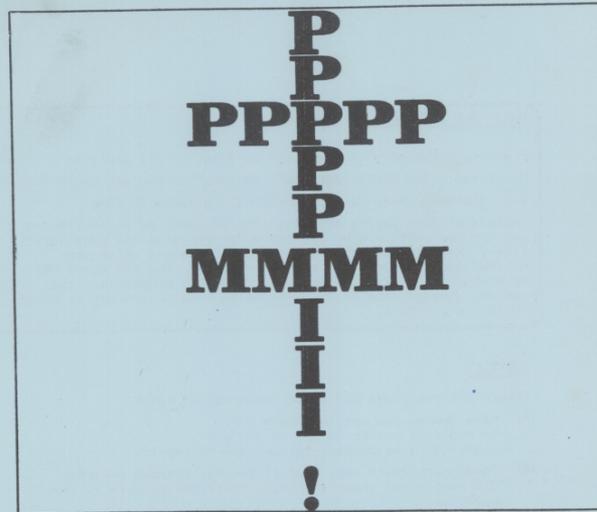
What assumptions are being made here?



Stand-Alone Thinking Skills Programs

PROJECT

1. All cars should be banned from city centres so that people can walk about freely.
2. Every young person should adopt one old person to look after.
3. People should be allowed to work 10 hours a day for 4 days and have the rest of the week free, instead of working 8 hours a day for 5 days.



CoRT 1 Pupil's Notes



Pergamon Press ISBN 0 08 027422 6 (pack of 10 copies of each of 10 lessons)

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CoRT THINKING
notes by Edward de Bono

Image Removed: Overview of the Creative Problem-solving Process Chart

Generic vs. Situated Skills

Generic Skills

- Learning the “Big Ideas” (what good thinkers do; issues with relevancy)
- Skills are typically made explicit.
- Novices can typically apply them.
- Do all students get to learn them?
- The contexts for transfer may be less likely to be noticed but they are often generic enough that students can apply them.

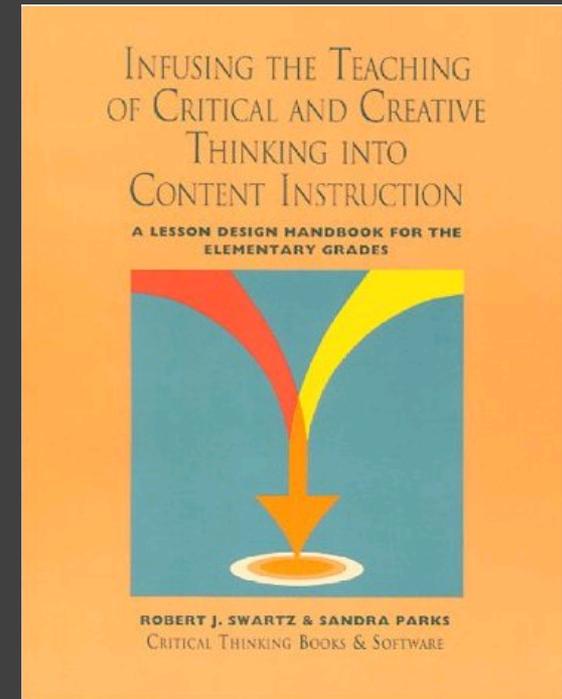
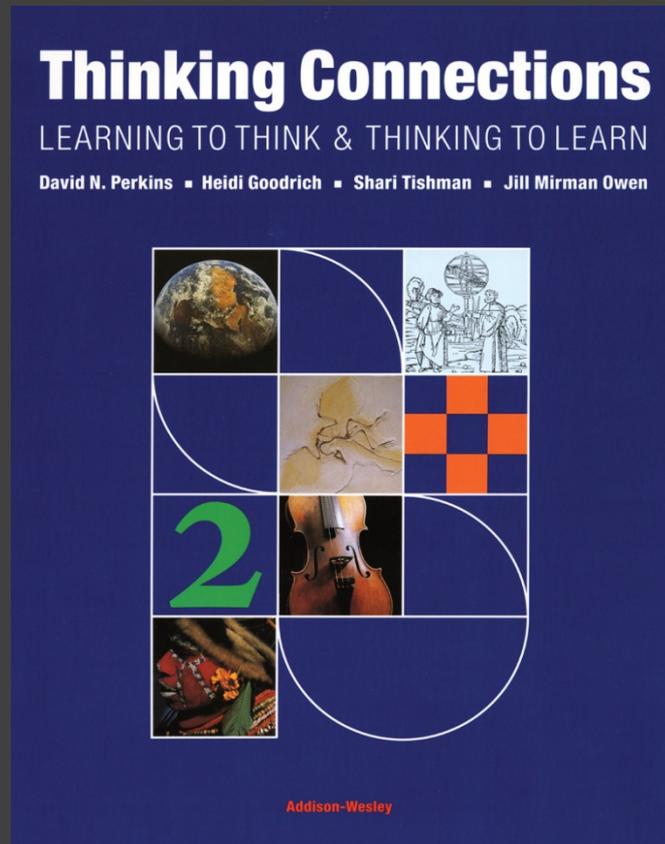
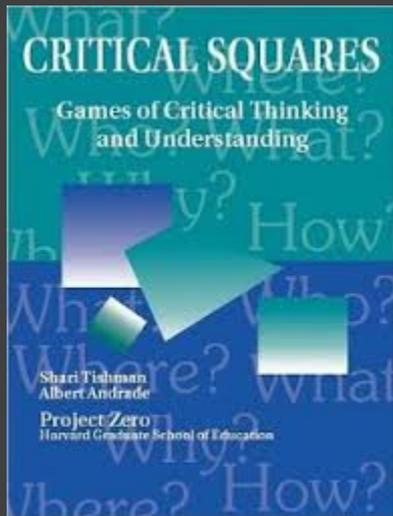
Situated Skills

- Nuance to the contexts
- Often require opportunistic teaching and therefore very skilled instruction
- How explicit are they? Depends upon instruction....
- More challenging for novices.
- Often wedded to the contexts in which they are taught, though applicable (more narrowly) when cued by context.

Generic

Situated

Infusion Approaches to Thinking Skills



Thinking Dispositions

- Sensitivity
- Ability
- Inclination

Thinking Dispositions...

1. The disposition towards broad and adventurous thinking.
2. The disposition towards wondering, problem finding, and investigating.
3. The disposition to build explanations and understandings
4. The disposition to make plans and be strategic.
5. The disposition to be intellectually careful.
6. The disposition to ask for and evaluate reasons.
7. The disposition to be metacognitive.

-Tishman et al.

Encouraging Learners to Seek and Evaluate Reasons

What attitudes (or dispositions) support reasoning behaviors?

- ▶ The tendency to question the given.
- ▶ An alertness to the need for evidence.
- ▶ The urge to weigh and assess reasons.
- ▶ A tendency to play devil's advocate -- to look at the other side of the case

What do good thinkers tend to do when they seek and evaluate reasons?

- ▶ Ask why!
- ▶ Look for justifications, reasons in favor, reasons against
- ▶ Demand and provide proof
- ▶ Identify the reasons that count the most, the least
- ▶ Look for consequences, implications

What are some common pitfalls connected to seeking and evaluating reasons?

- ▶ Jumping to conclusions without thinking about the reasons why the conclusions make sense or not.
- ▶ Not searching beyond the obvious reasons
- ▶ Not looking beyond the obvious information or evidence.
- ▶ Exploring only a narrow path, without considering possible branches.
- ▶ Neglecting relevant information.
- ▶ Mindlessly accepting questionable authority
- ▶ Stubbornly holding on to a view because it's yours.
- ▶ Passively taking in information without actively thinking it through.

What are some of the words you might hear (or encourage) as children are seeking and evaluating reasons?

evidence	How do you know?	conclusion
I think..... because....	What makes you sure?	How come?
But look at it this way...	Yeah, but...	why?!
My reasoning is....	reason	prove it!
When I saw..., it made me think...	I see it differently because....	
I thought that, but then I noticed... and it made me think.....		

Defining Metacognition

What is meta?

What is cognitive?

Levels of Thinking and Metacognition

- thinking
- awareness of thinking
- describing thinking
- evaluating thinking
- monitoring thinking
- reflecting upon the nature of thinking (both generically and the epistemic moves in the disciplines)

Image Removed: Overview Chart of Metacognitive Stages and Questions

Developing a Language for Metacognition: A Vocabulary of Mind

What words describe
your thinking?

A language of metacognition by 4th and 5th graders

- “My thinking is stuck in a rut.”
- “I am stuck in mental glue.”
- “Once my thinking went down one path, I couldn’t get back to the other path.”
- “My mind was paying attention and then it forgot to listen.”
- “I realized that I was trying harder but not smarter.”

Metacognition is a critical piece of self-regulated learning

- Being aware of your thinking and learning
- Assessing your ability to attend
- Modifying your learning space to work for you
- Structuring problems to help you enter them
- Monitoring your success

Jigsaw Discussion about the Research Findings

- Working in groups of three or four, divvy up the research findings and have each person read a section deeply.
- Share what you have each learned and reflect together upon the implications for instructional design. Draw upon the readings for this week in your discussion.
- Have one person in your group record insights, puzzles, or questions on an index card or under the discussion section of the course website if you have a computer.

Questions from the Reading Guide

- What levels of thinking and metacognition do the readings refer to? Create a mapping for yourself of how the different levels might relate. What puzzles do you perceive in the mapping of these levels?
- Perkins, Simmons and Tishman consider difficulties that arise when engaging students in thinking and metacognitive strategies. What are these difficulties and how might they interact with learning?
- What potential solutions do Perkins and colleagues suggest for the difficulties mentioned in question #2?
- The Swartz and Parks article and Joseph article offer examples of how to integrate metacognition into structured instruction. Consider how metacognition can play a role in other learning opportunities such as sports, playing digital games, reading a good novel and so forth.

Looking for Metacognition in Classroom Discourse

- What language about the nature of thinking do you hear from the teacher or students?
- How does the teacher invite the students into thinking about thinking?
- What roles do affect and cognition play?
- What else might the teacher do to encourage a focus on thinking and metacognition?

Two Examples: PonderPoints and Math as a Social Activity

<http://www.edutopia.org/math-social-activity-cooperative-learning-video>

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Resources: Concrete Instructional Examples on the Course Website

- Building a Culture of Thinking
- Modes of Infusing Metacognition
- Cueing and Advice to Learners
- Website Resources

Building a Culture of Thinking

Take **TIME** for Thinking!

Getting an answer quickly only counts in certain situations, like races or timed tests. So unless you have to react quickly, take time to think and give a thoughtful answer, not a fast one!



Don't use the stopwatch approach to thinking. Give your brain time to work at thinking and learning.

☞ Push past your first ideas, then give your most thoughtful response.

Even if an idea seems confusing at first, don't give up. Confusion is often a natural part of learning especially when you really push your thinking.



Good thinking takes time!

Modes of Infusing The Teaching of Thinking and Metacognition

- Pair Problem-Solving
- Reciprocal Teaching
- Inquiry Cycles
- How Hot is Your Thinking Thermometer?
- Sensible, Plausible, Believable
- Thinking Connections
- Concept Mapping with Reflection
- Brain-Storming with Reflection

Cueing and Advice to Learners (Within the Design for Instructors)

Checking In

Ask the students to stop for a few moments and ask themselves the following questions:

- 1) Am I PUSHING my thinking to explore the concepts deeply? (If a concept is hard, am I not giving up but trying to think it through?)
- 2) Am I thinking carefully about what my classmates are saying?
- 3) Am I working “minds-on”—actively thinking about the patterns—instead of just letting my classmates answer?

Website Resources

- Thinking About Thinking/Annenberg Series on Metacognition
http://www.learner.org/courses/learningclassroom/session_overviews/metacog_home9.html
- Artful Thinking www.pzartfulthinking.org
- Making Thinking Visible
www.visiblethinkingpz.org

Connecting Forward...

What are some places in your own instructional design where it would enhance learning to infuse a focus on thinking and metacognition?

Unpacking Some of the Class Design

- I asked you to engage in an experience of metacognition so that you would have an appreciation for the affective and cognitive challenges (constructivist approach/active processing).
- I asked you to analyze two examples of practice as a means of actively processing what metacognition could look like (One plus one is more than two because it helps to surface the deep structure of the concept and to grasp variations.)