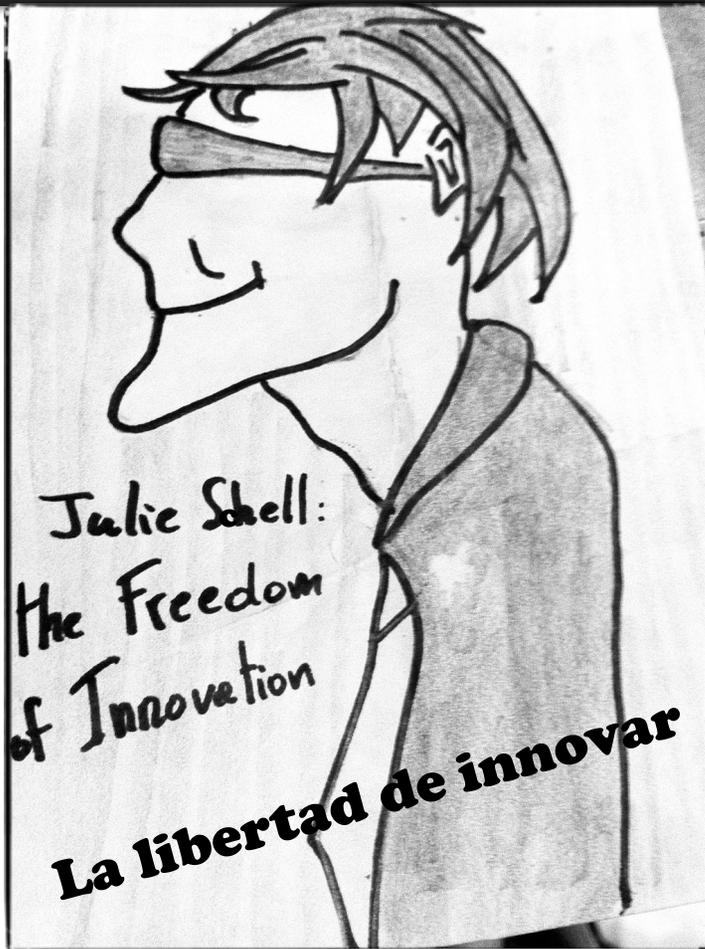


Rethinking student learning evaluation in higher education



Julie Schell

Postdoctoral Fellow

Mazur Group



University in the 21st Century:
From Teaching to Learning
Cambridge, MA
October 21, 2011



mazur.harvard.edu



Get your clickers ready!



- No on off
- Answer shows on display
- Only last click counts

Quick survey

Clickers:

- 1.Never heard of them
- 2.Never tried one
- 3.Have tried but not used one in class
- 4.Have used them in my class

Think of something you know very well....



How did you learn it?

Think of something you know very well....

How did you learn it?

1. Listening to a lecture
2. In a university classroom
3. Memorizing, then reproducing
4. Taught myself, trial and error
5. Working in a team
6. Observing others
7. Otro

The Baseball Problem



Message

Students learn to survive school...

They do not learn in school



Who is primarily responsible for inauthentic learning?

1. Students
2. Parents
3. Educational system
4. Instructors

Message

We are culprits of ineffective learning and we must change, now.

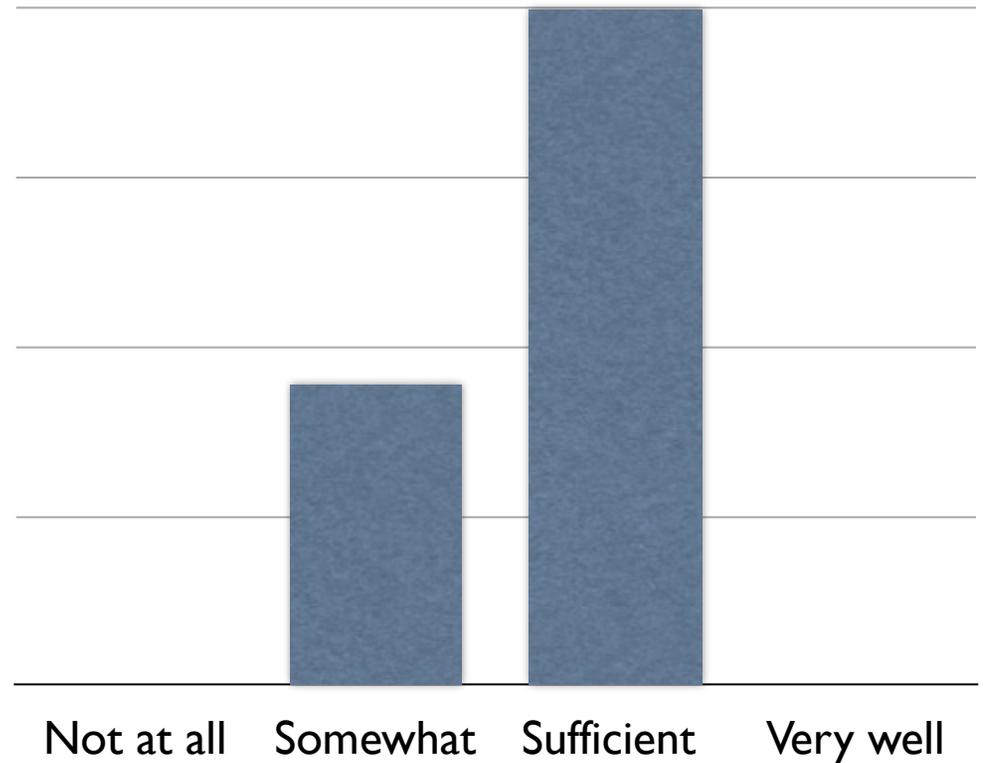


How well do you think your current graded evaluations measure authentic learning in your students?

1. Not at all
2. Somewhat
3. A sufficient amount
4. Instructors

How well do you think your current graded evaluations measure authentic learning in your students?

Pre-enrollment form responses



The Black Silicon Problem

The New York Times

October 12, 2008

SLIPSTREAM
Intuition

By [JOHN MARK](#)

IT started with silicon, that could be used in solar cells.

On Monday, He in Beverly, Mas

This would nev original purpos science and tech less likely.

A more narrow payoff.

But in the curre Estrin, an elect in a Global Eco

Black silicon wa was doing in the late 1990s. His research group had been financed by the Army Research Organization to explore catalytic reactions on metallic surfaces.



ing a new material, call sensitive sensors to p

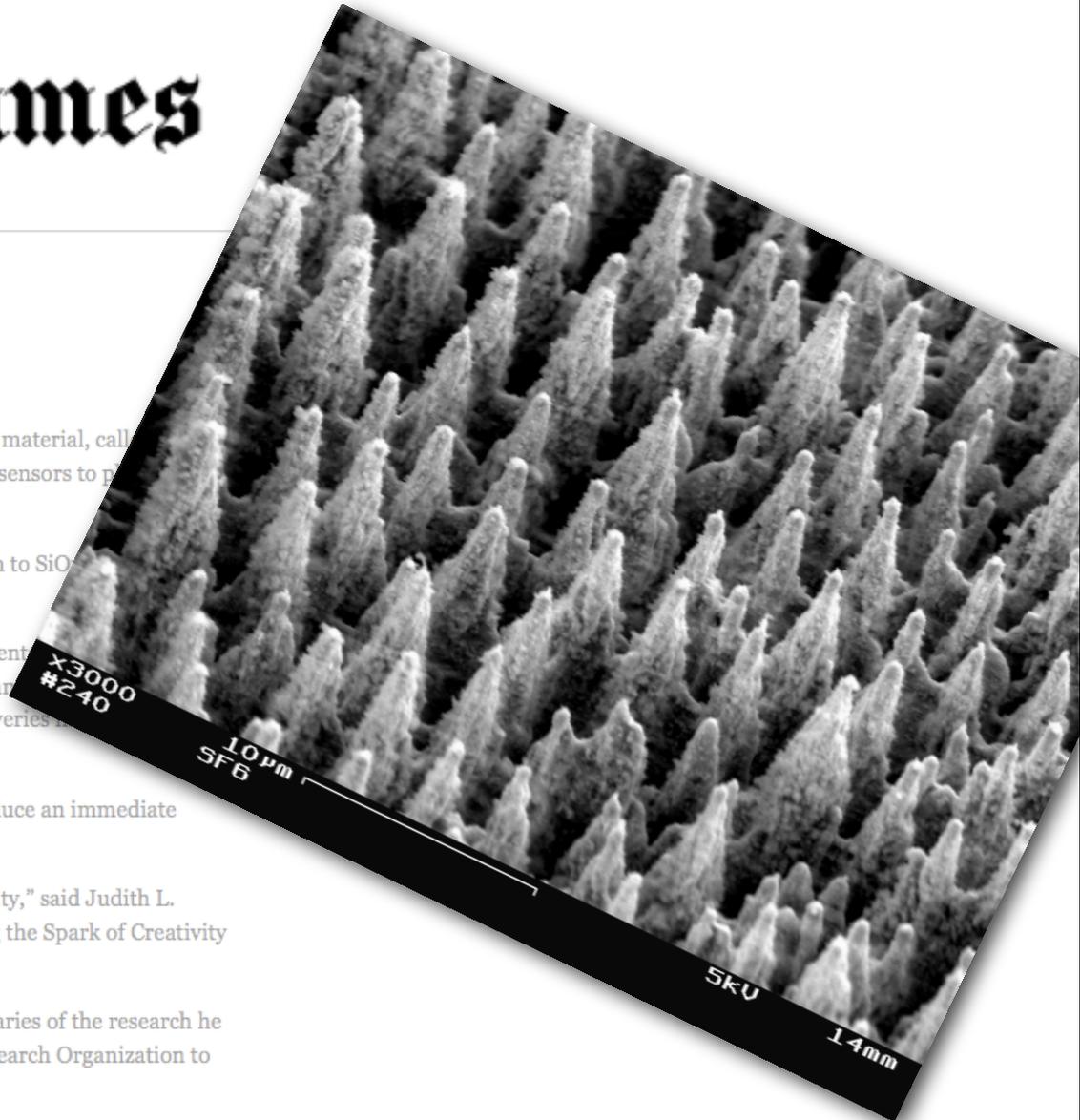
ack silicon to SiO

uate student in govern like discoveries

ly to produce an immediate

serendipity," said Judith L. reigniting the Spark of Creativity

the boundaries of the research he was doing in the late 1990s. His research group had been financed by the Army Research Organization to explore catalytic reactions on metallic surfaces.



Dar a los estudiantes



How?

**Prepare students
for innovative thinking**

by rethinking evaluation

Julie Shell:
The Freedom
of Innovation

la libertad de innovar

Rethinking student learning evaluation in higher education

**Traditional
vs.
Innovative
Evaluation**

**Evaluation
techniques**

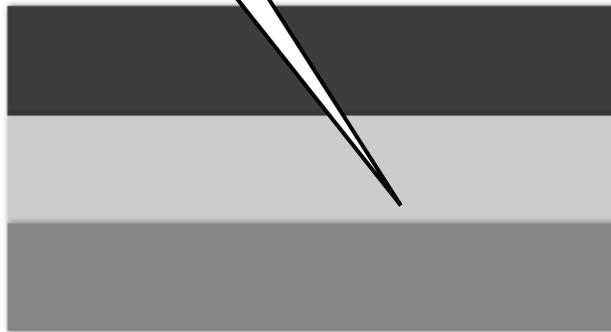
Rethinking student learning evaluation in higher education

**Traditional
vs.
Innovative
Evaluation**

Evaluation
techniques

Problem with traditional evaluation

- separate from teaching & learning
- periodic
- late
- unidimensional
- inauthentic
- homogenous
- vague



Traditional evaluation



Teaching

How can we rethink evaluation?

- separate from teaching & learning
- periodic
- late
- unidimensional
- inauthentic
- homogenous
- vague



Traditional evaluation

- linked
- frequent
- early
- multidimensional
- authentic
- heterogenous
- specific



Teaching

Innovative evaluation

Big Idea: Metacognition

Metacognition is:

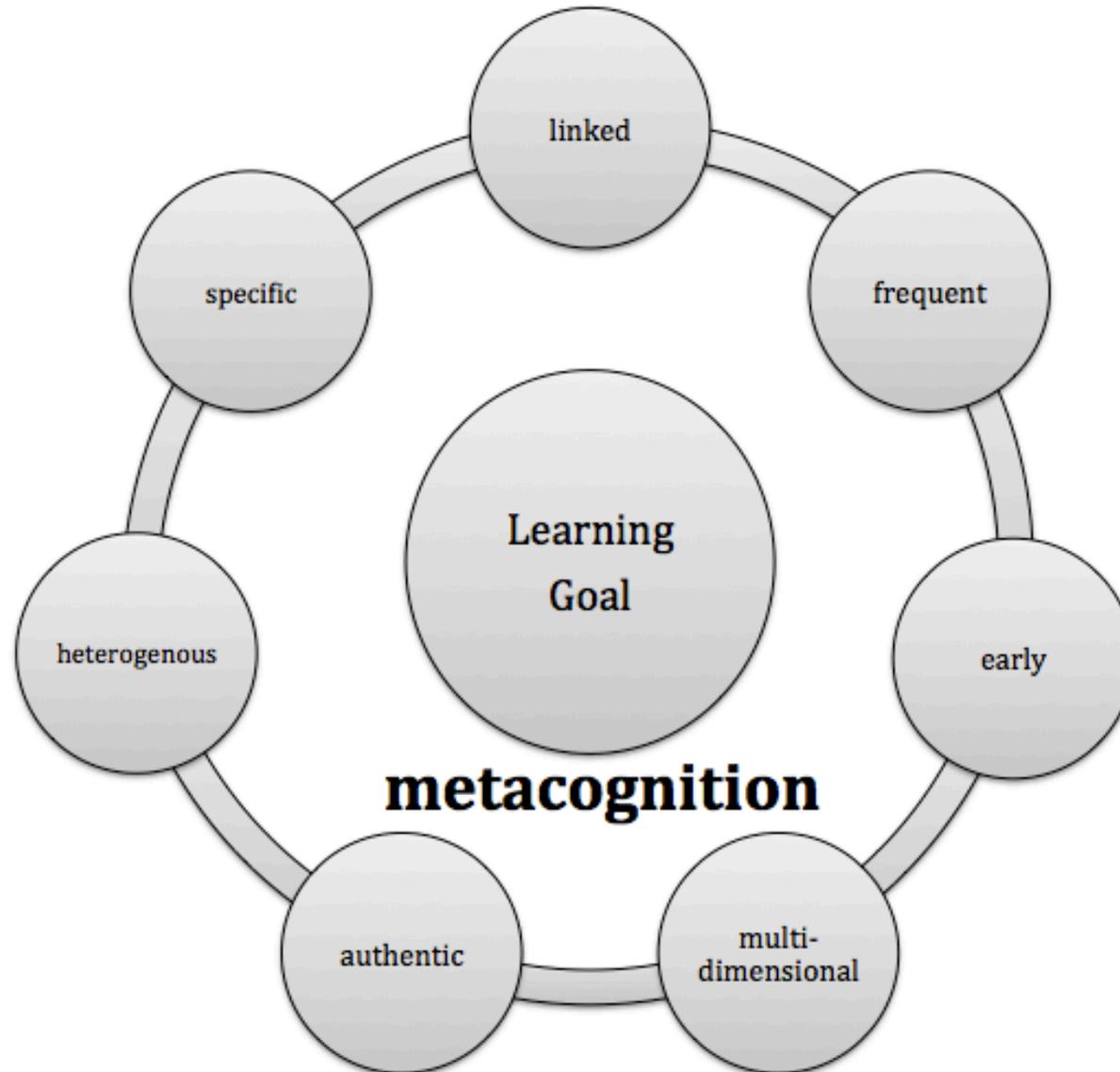
J. H. Flavell (1976) described metacognition as: “one’s knowledge concerning one’s own cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data. For example, I am engaging in metacognition if I notice that I am having more trouble learning A than B; if it strikes me that I should double check C before accepting it as fact.

Rethinking student learning evaluation in higher education

Traditional
vs.
Innovative
Evaluation

**Evaluation
techniques**

Julie's best practices circle of learning



Learning goals

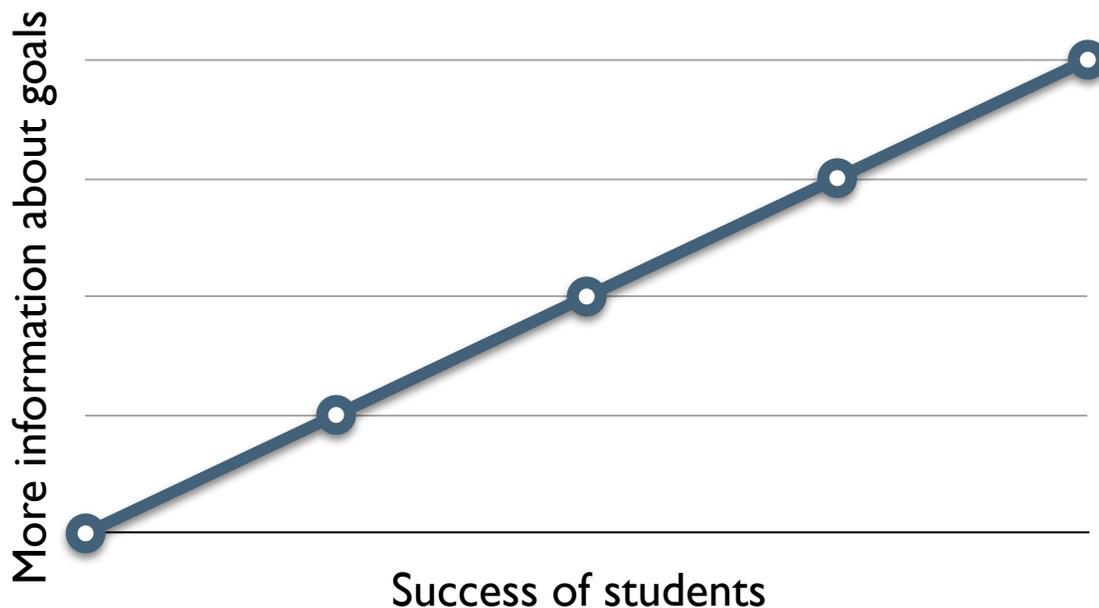
How do I measure my students' learning?

The first step is to make clear and explicit what it is you want them to learn and be able to do.

Learning goals

THE RESEARCH on teaching and learning is consistent: the more information you provide your students about the goals of a course and the criteria you will use to evaluate their performance, they more successful they will be. The first step is to design a set of learning goals for the course.

Robert M. Diamond



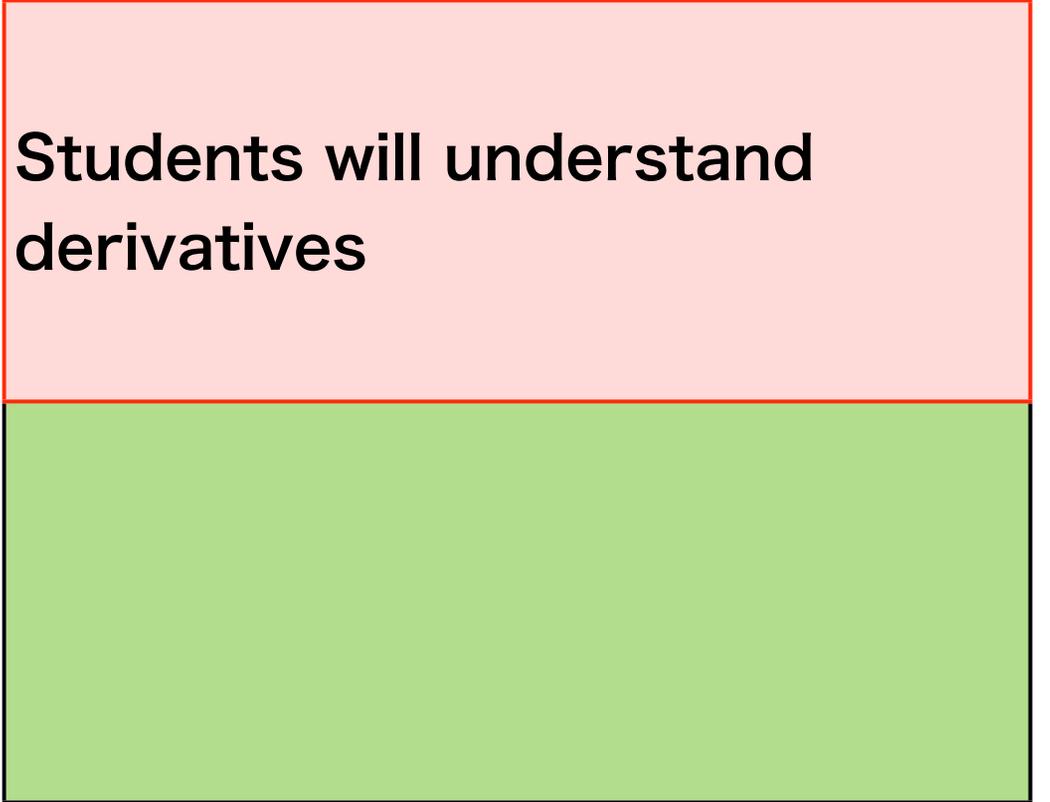
Learning goals

Learning goals should be:

Action-oriented

Specific

Measurable



**Students will understand
derivatives**

Learning goals

Learning goals should be:

Action-oriented

Specific

Measurable

**Students will understand
derivatives**

**Students will be able to
calculate derivatives in order
to solve problems**

Learning goals

Knowledge	Under- standing	Application	Analysis	Synthesis	Evaluation
List Recall Repeat	Explain Discuss Review	Solve Illustrate Apply	Analyze Contrast Compare	Create Predict Develop Design	Judge Assess Validate Infer

Bloom's Taxonomy, 1956; Wilson, 2006

Learning goals

A professor of music is preparing her course and she comes to you shows you her learning goals and asks you for advice. You tell her the three key characteristics of a good learning goal are:

1. Strategic, frequent, & specific
2. Action-oriented, frequent, and multi-dimensional
3. Action-oriented, specific, and assessable
4. Specific, frequent, and multidimensional

Learning goals

Metacognition is:

1. Thinking about your own thinking
2. Thinking about big ideas
3. Thinking about cognitive science
4. I am not sure

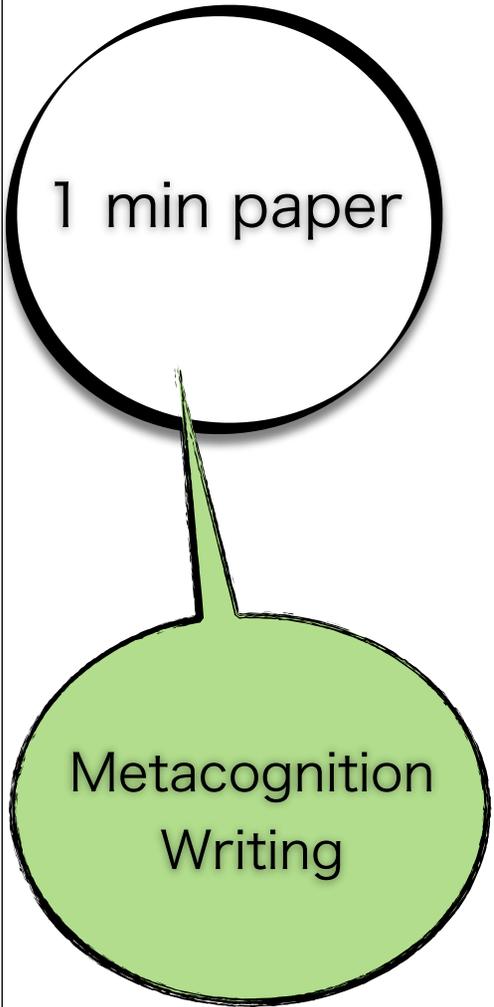
One Minute Paper



1. What is the most important thing you learned today?
2. What did you find most confusing or most difficult?

Evaluation techniques

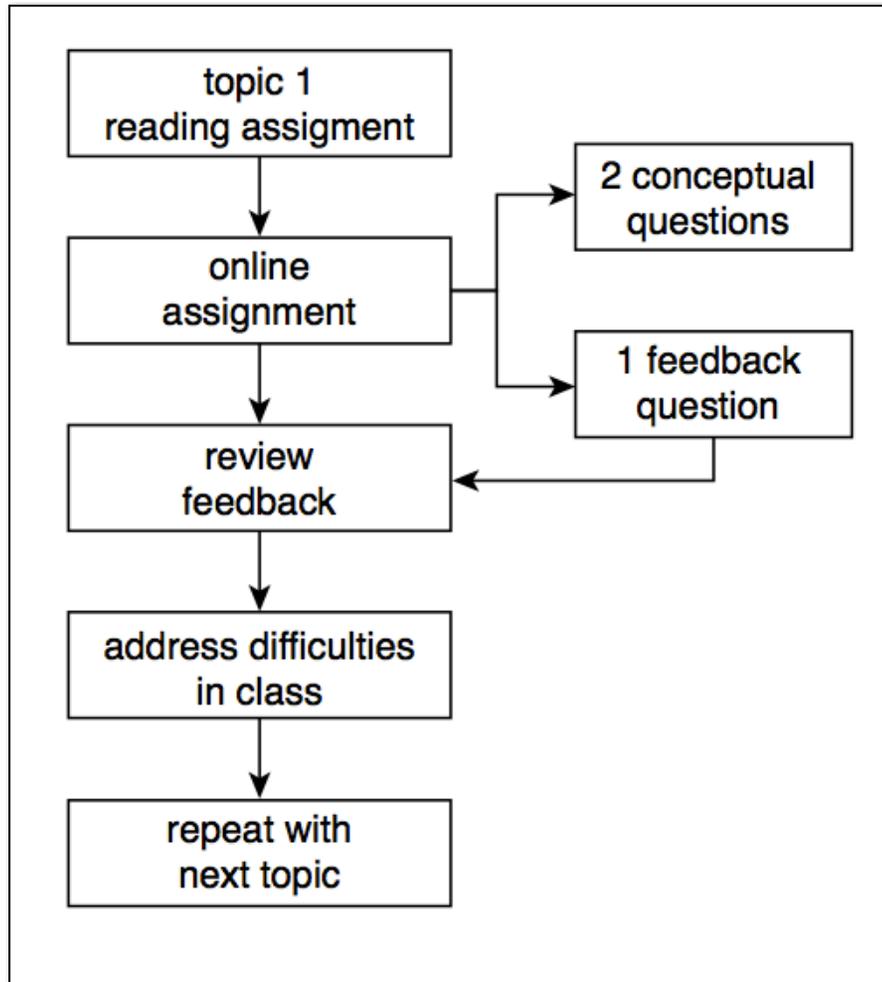
Skills and habits



1 min paper

Metacognition
Writing

Just-in-Time-Teaching



1. Assign a reading
2. Online reading assignment
-----2 conceptual questions
-----What did you find confusing or difficult about what you read?
3. Read the students' feedback
4. Address the students' difficulty in class
5. Repeat with the next topic

Evaluation techniques

Skills and habits

1 min paper

JiTT

Metacognition

- 1.Preparation
- 2.Reading skills
3. Metacognition

Rubrics

Rubrics provide:

- Heterogeneous feedback
- Self, Peer, Expert versus only Expert
- Specific versus Vague

	0	1	2	3	4
Complete/proprate			Developing	Proficient	Expert
Expert					

Rubric

Presentation skills rubric

0 Incomplete/ Inappropriate	1 Novice	2 Developing	3 Proficient	4 Expert
Eye contact turns back to audience or reads from notes entire time	reads from notes, looks up only rarely	looks at notes or screen a bit, only looks at one area of audience	never looks at screen or notes, makes eye contact with whole room	uses eye contact to make point and connect with audience
Slides No slides or presentation prepared	All slides have design flaws	Some slides well designed, others design flaws	Most slides well designed, very few design flaws	All slides well designed, elegant

Evaluation techniques

Skills and habits

1 min paper

Metacognition

JiTT

Preparation
Reading skills
Metacognition

Rubric

Evaluation
-self, peer, expert
Metacognition

Writing effective multiple choice questions

Anatomy of a multiple choice question

Stem { **Metacognition is:**

- Options** {
1. Thinking about your own thing thinking
 2. Thinking about big ideas
 3. Thinking about cognitive science
 4. I am not sure

Writing effective multiple choice questions

Anatomy of a multiple choice question

Tips for good stems:

1. Ask complete question
2. Avoid which of the following
3. Avoid common knowledge
4. Avoid negative items
5. Avoid grammatical clues

Writing effective multiple choice questions

Anatomy of a multiple choice question

Tips for good options:

1. 3-5 options
2. Order responses logically
3. Keep all same length
4. Avoid common knowledge
5. Avoid repeating words
6. Avoid: none of the above
and all of the above

Writing effective multiple choice questions

Anatomy of a multiple choice question

Tips for good distractors:

1. Anticipate misconceptions
2. Use true or plausible statements

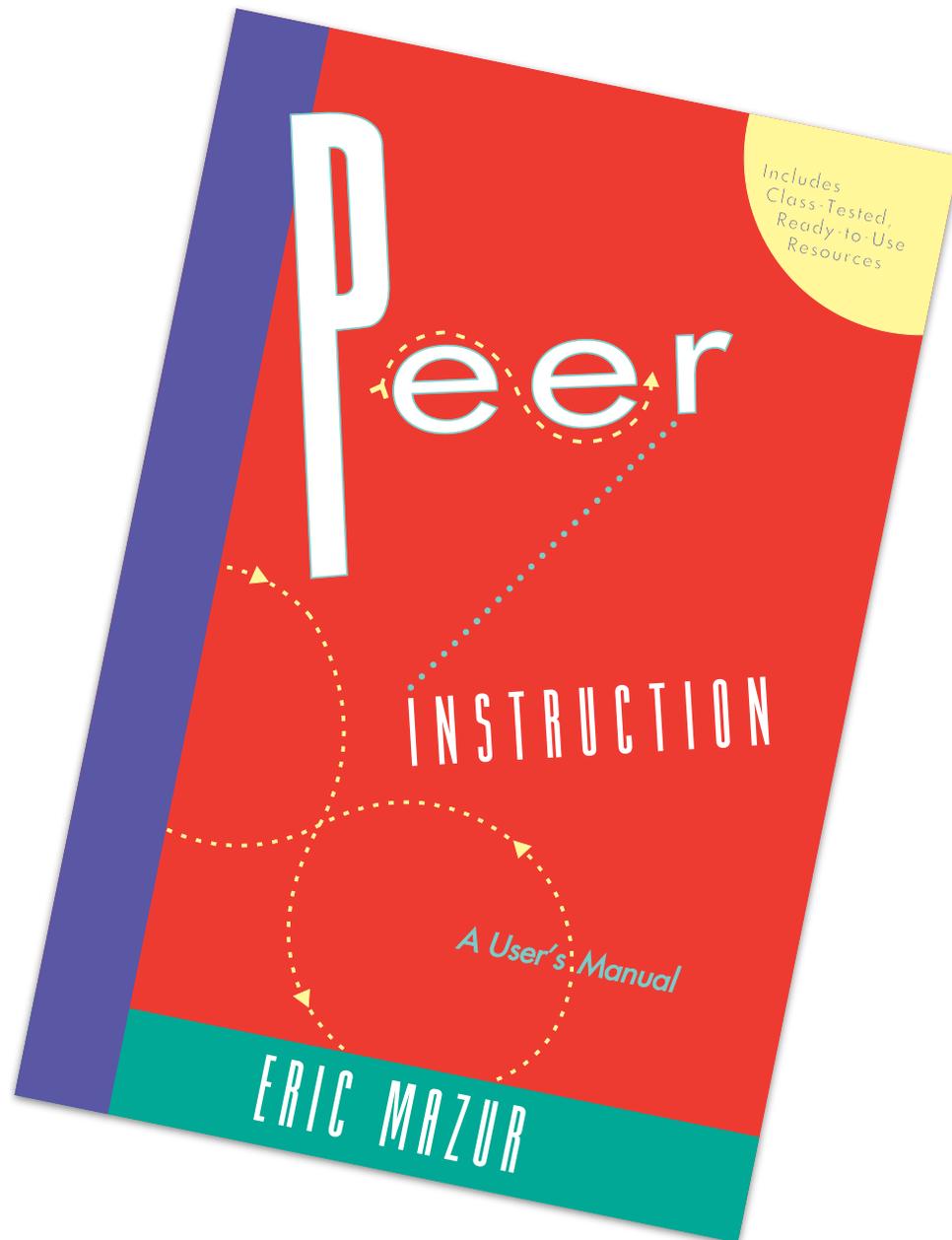
Writing effective multiple choice questions

A student is taking a multiple choice test and the following answers are provided. She has NO idea what the answers is, so she decides to guess. Which item, based on writing effective multiple choice questions, do you think she selects?

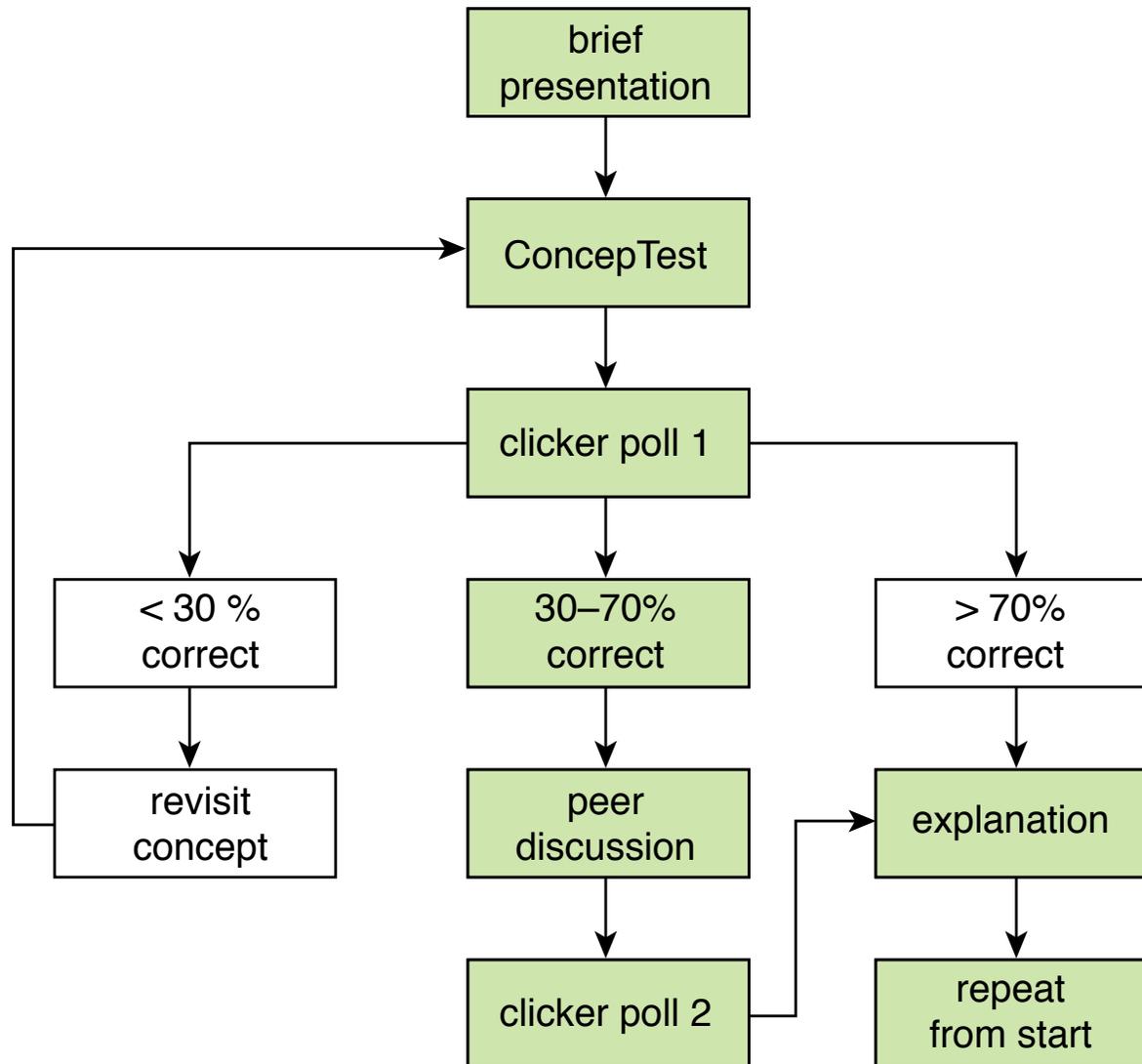
The exam question is: What is the purpose of the juca in our field?

- 1 The juca gives light
- 2 The juca gives direction
- 3 The juca gives sound
- 4 The purpose of the juca in our field is that it is provides a path

Peer Instruction



Peer Instruction



ConceptTests

Introduction

Question

Thinking

Respond

Peer Discussion

Re-respond

Explanation

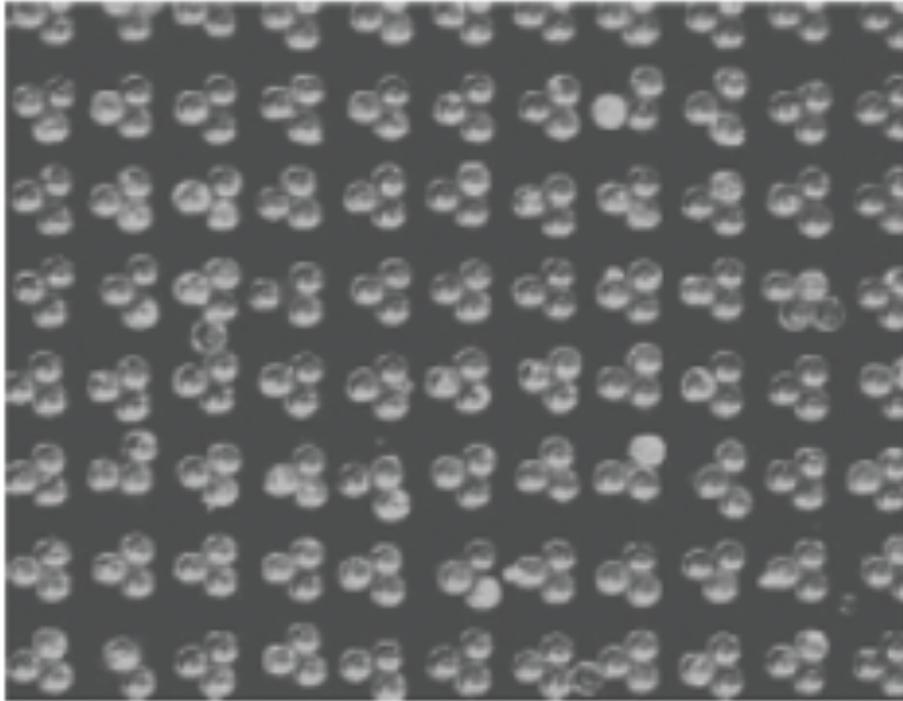


Peer
INSTRUCTION

A large, semi-transparent red circular logo is positioned in the background. It features the word "Peer" in a large, white, lowercase sans-serif font, and the word "INSTRUCTION" in a smaller, white, uppercase sans-serif font below it. The logo has a white, curled-up corner effect at the bottom right.

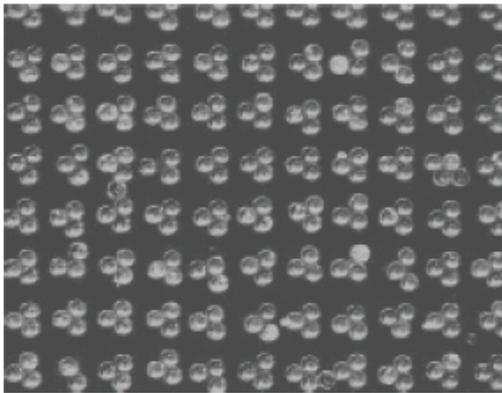
ConceptTests

original

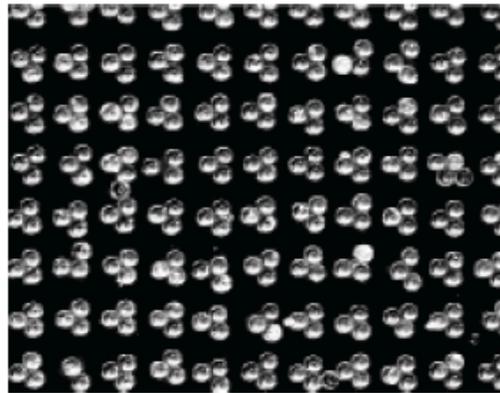


ConcepTests

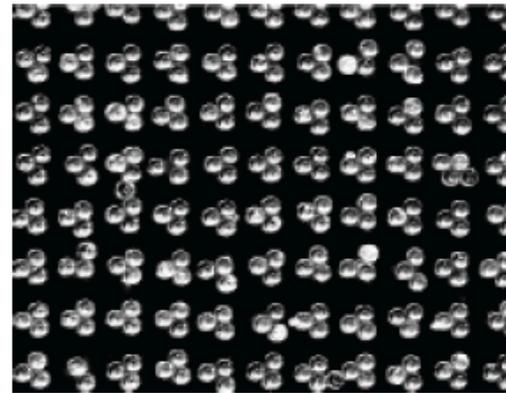
original



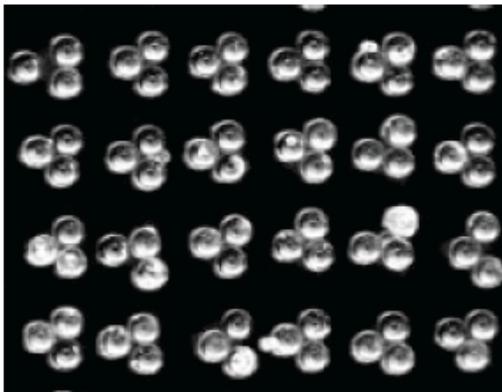
1. adjust contrast



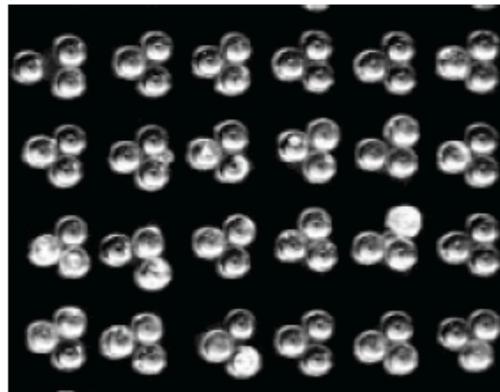
2. remove blemishes



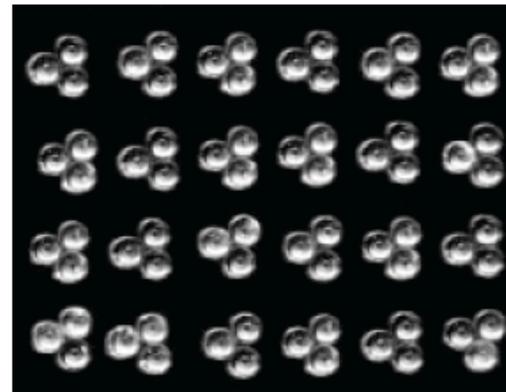
3. crop



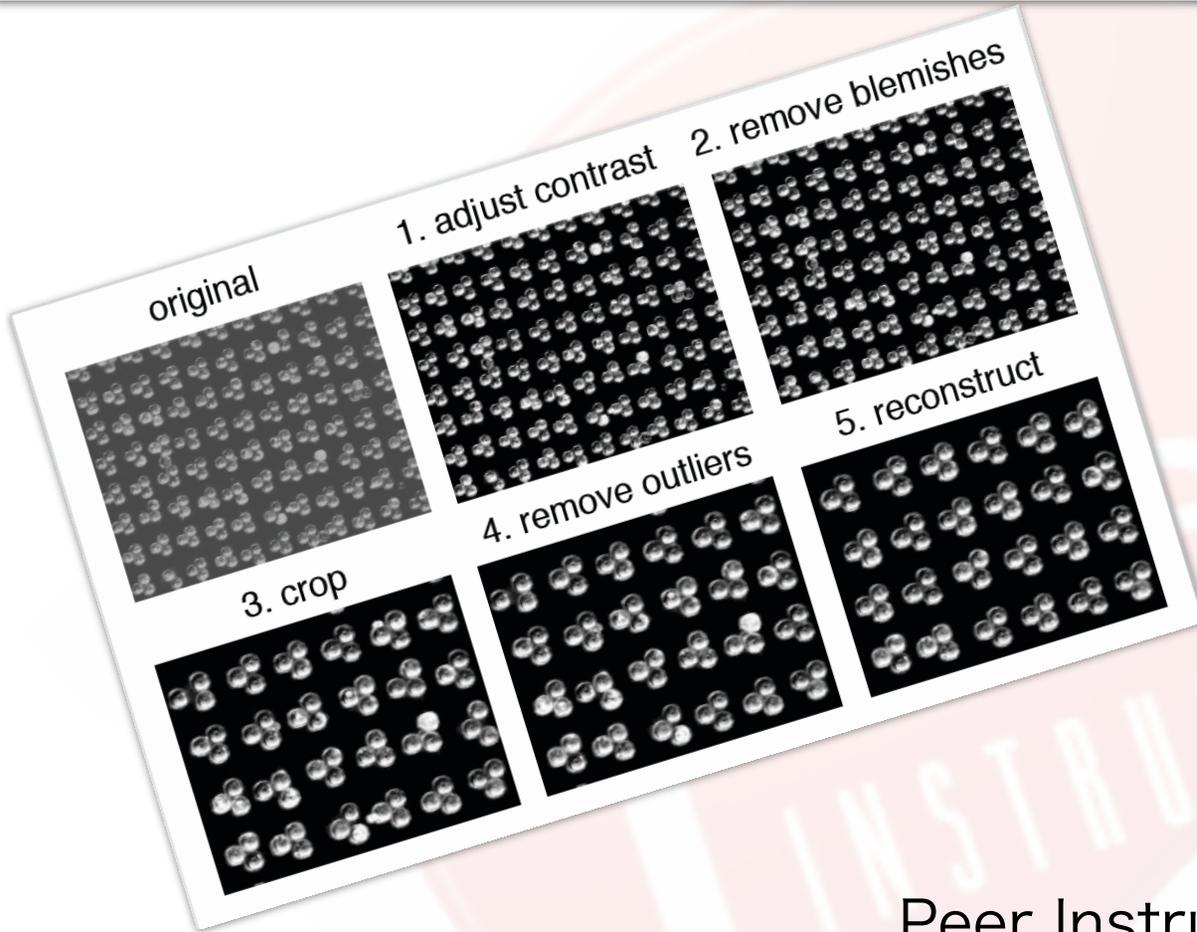
4. remove outliers



5. reconstruct



ConceptTests



Peer Instruction works,
even when there is no right answer!

Evaluation techniques

Skills and habits

1 min paper

Metacognition

JiTT

Preparation
Reading skills
Metacognition

Rubric

Evaluation
-self, peer, expert
Metacognition

Peer
Instruction

Conceptual
understanding
Persuasion
Evaluation
Metacognition

What is evaluation?



What is evaluation?

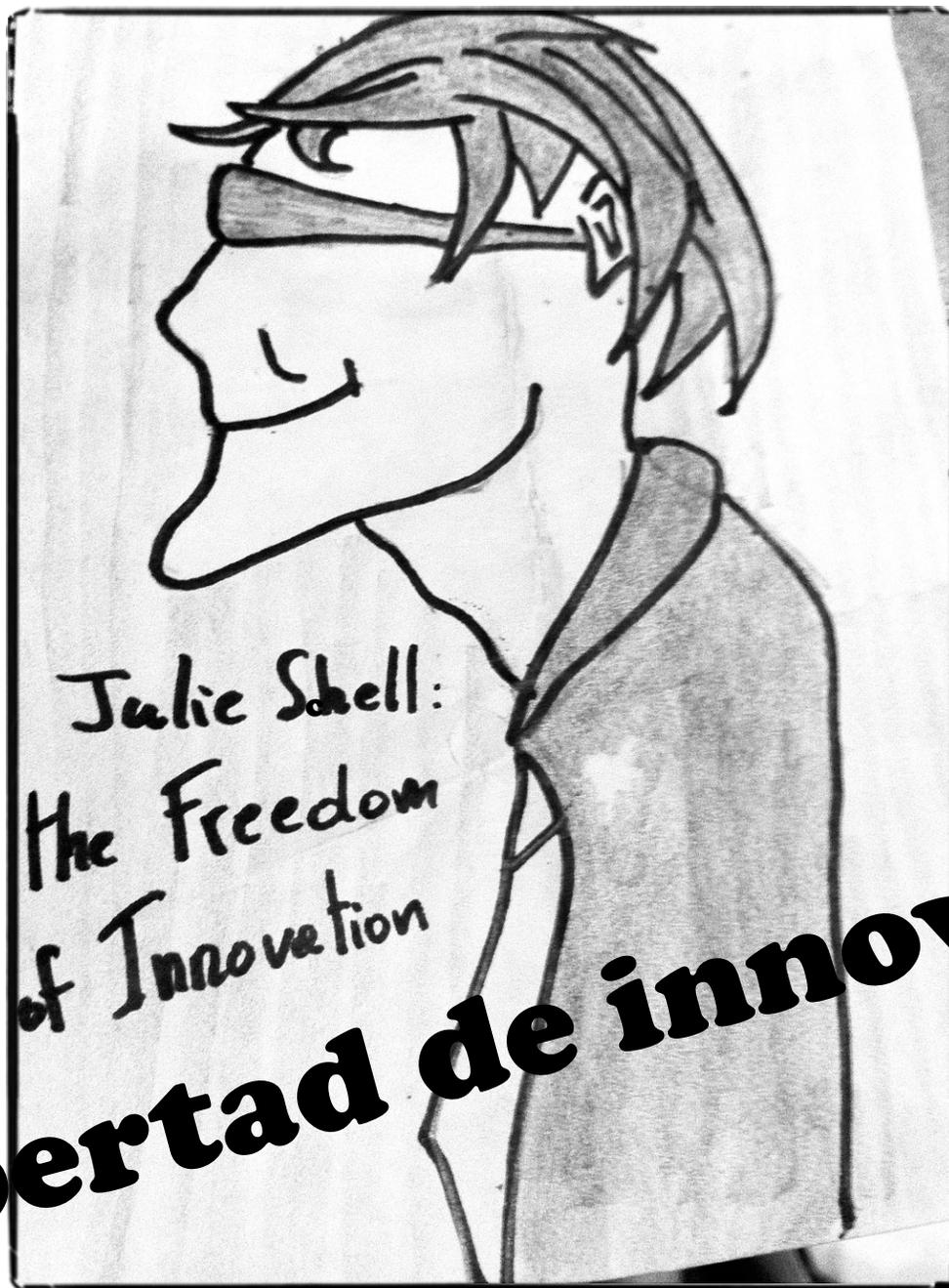
Origins of the term assessment

From early Latin	<i>assidere</i>
ad	to
sedere	sit, settle
assess	to sit by in counsel
assessor	one who sits by to give advice

Evaluation is teaching like Aristotle

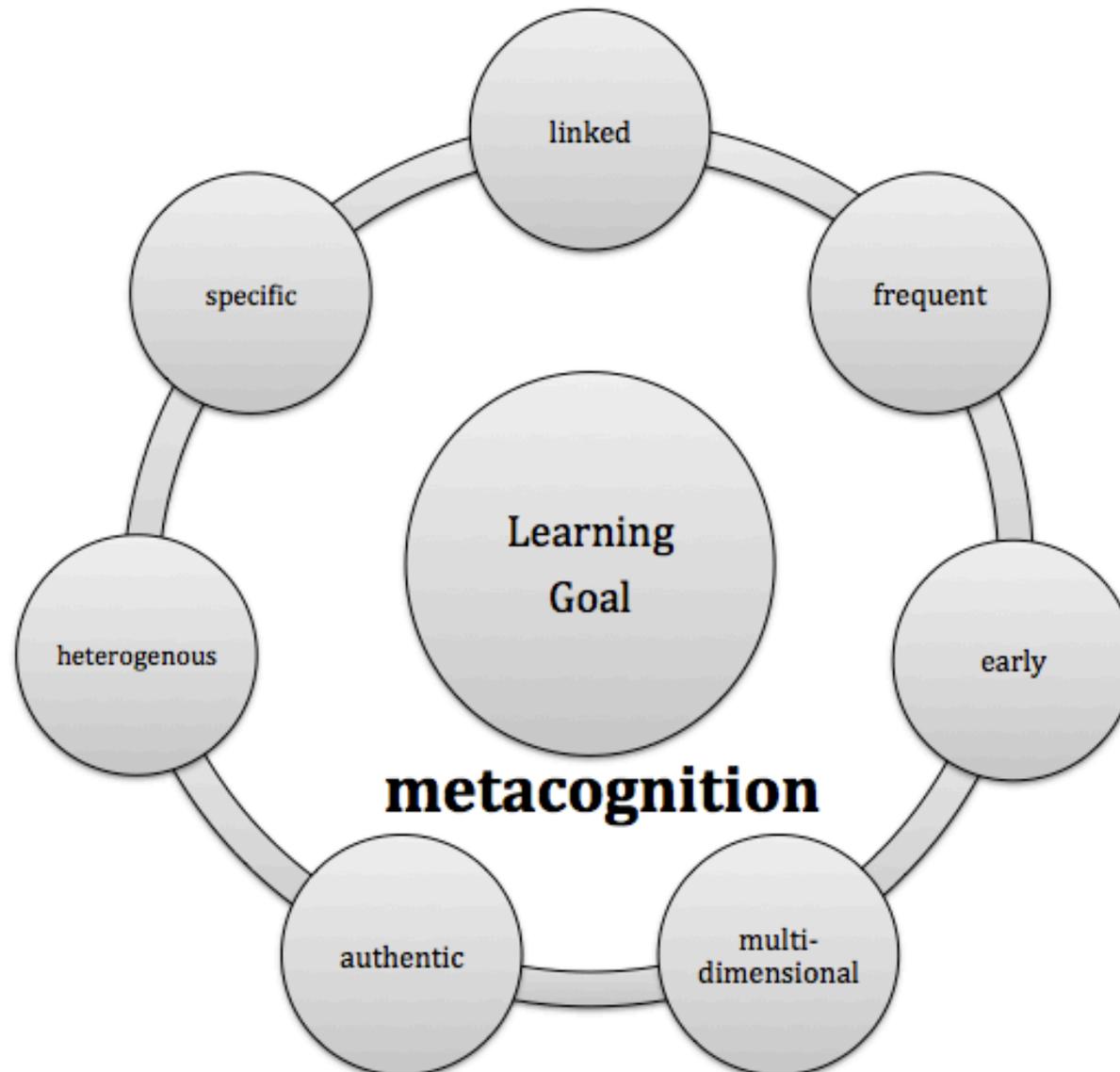


Dar a los estudiantes



la libertad de innovar

Julie's best practices circle for learning evaluation





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