Rethinking student learning evaluation in higher education

Program on Strengthening Teaching and Learning in the STEM fields in Uruguay

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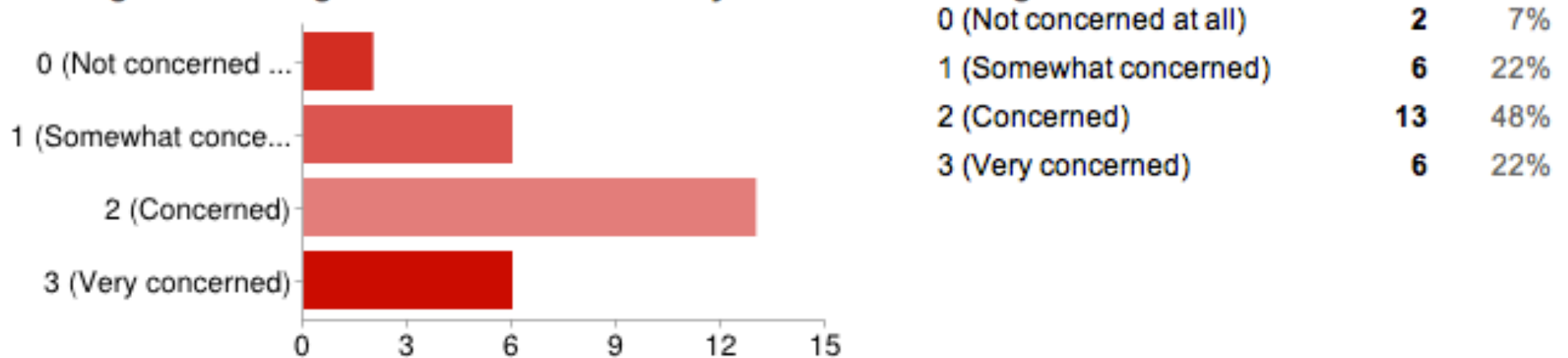
mazur.harvard.edu

GROUP

3 Big Reasons to Rethink Evaluation

When thinking about improving the course you are working on for this program how concerned are you about the following: - Not knowing how to measure whether my students are learning

0 (Not concerned at all)	**2**	7%
1 (Somewhat concerned)	**6**	22%
2 (Concerned)	**13**	48%
3 (Very concerned)	**6**	22%

- No on off button

- Only last click counts

- Answer displays screen

I have used a clicker before?

1. Yes
2. No
3. I'm not sure

Essential questions

Essential Questions for Rethinking Student Learning Evaluation

1. What is my approach to evaluation?

2. Why should I rethink my approach to evaluation?

3. How can I rethink my approach to evaluation?

Workshop Goals

After this workshop you should be able to:

1.Identify your own approach and some Big Reasons for rethinking evaluation

2. Select several techniques for using evaluation as a learning tool

3. Identify some best-practices for designing effective evaluations

3 Big Reasons to Rethink Evaluation

Think of a typical exam or essay test in your course...

3 Big Reasons to Rethink Evaluation

Think of a concept you teach...

Write down a question you used to evaluate your students' learning of that concept.....

Think of a concept you teach...

Write down a question you used to evaluate your students' learning of that concept.....

How well does this question measure authentic student learning?

3 Big Reasons to Rethink Evaluation

Think of a concept you teach...

Write down a question you used to evaluate your students' learning of that concept.....

How well does this question measure authentic student learning of that concept?

1. Not at all
2. Somewhat (a little bit)
3. A sufficient amount (enough)
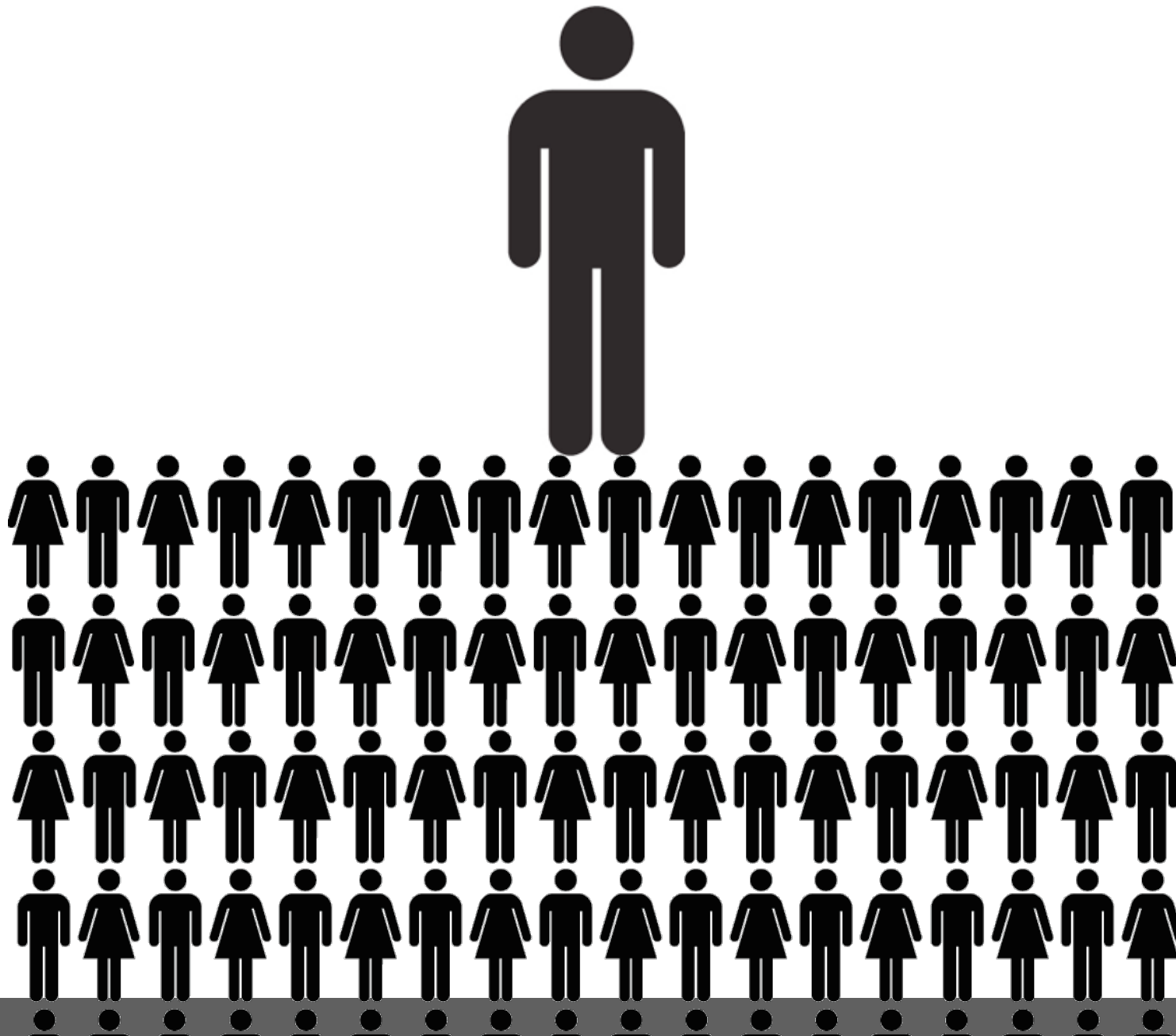4. Very well

Why should I rethink evaluation?

Reason 1
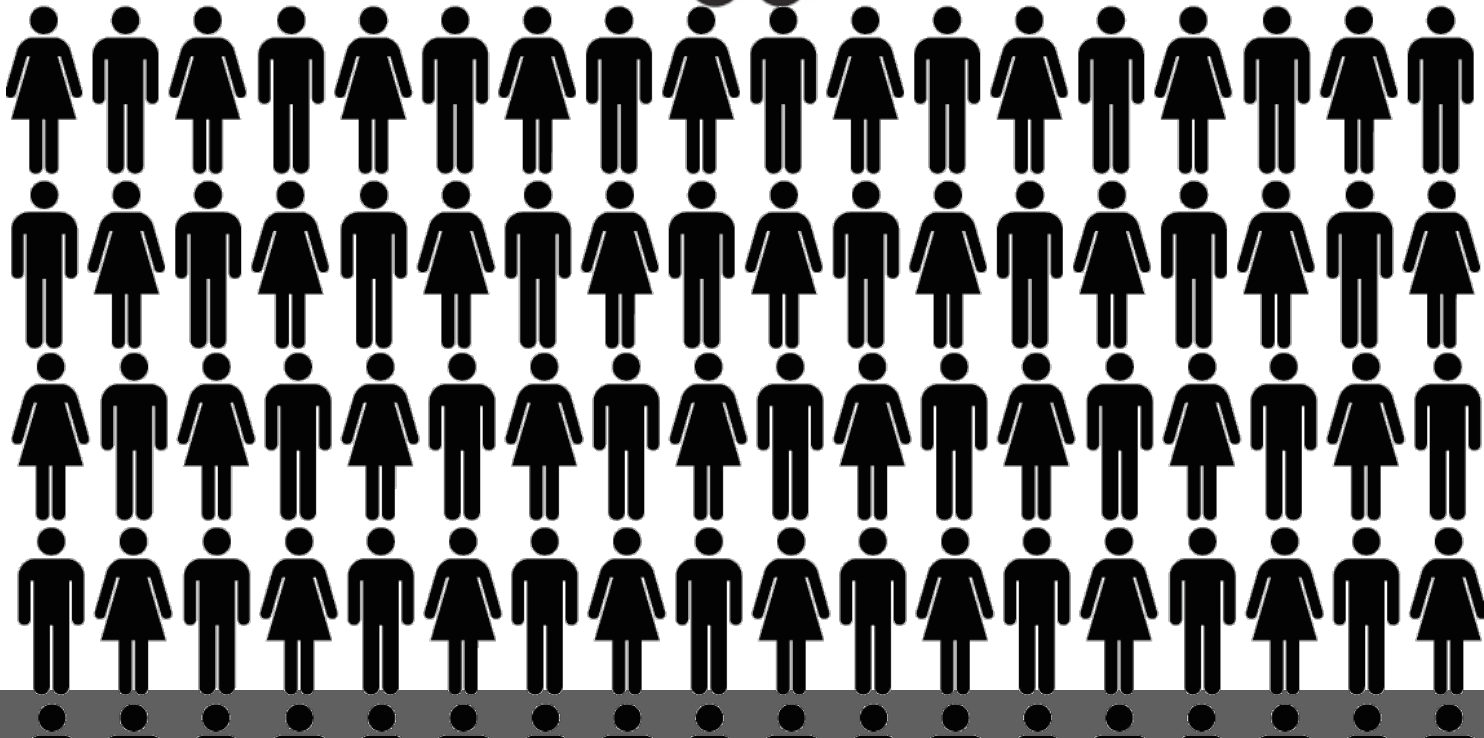
Deception

3 Big Reasons to Rethink Evaluation
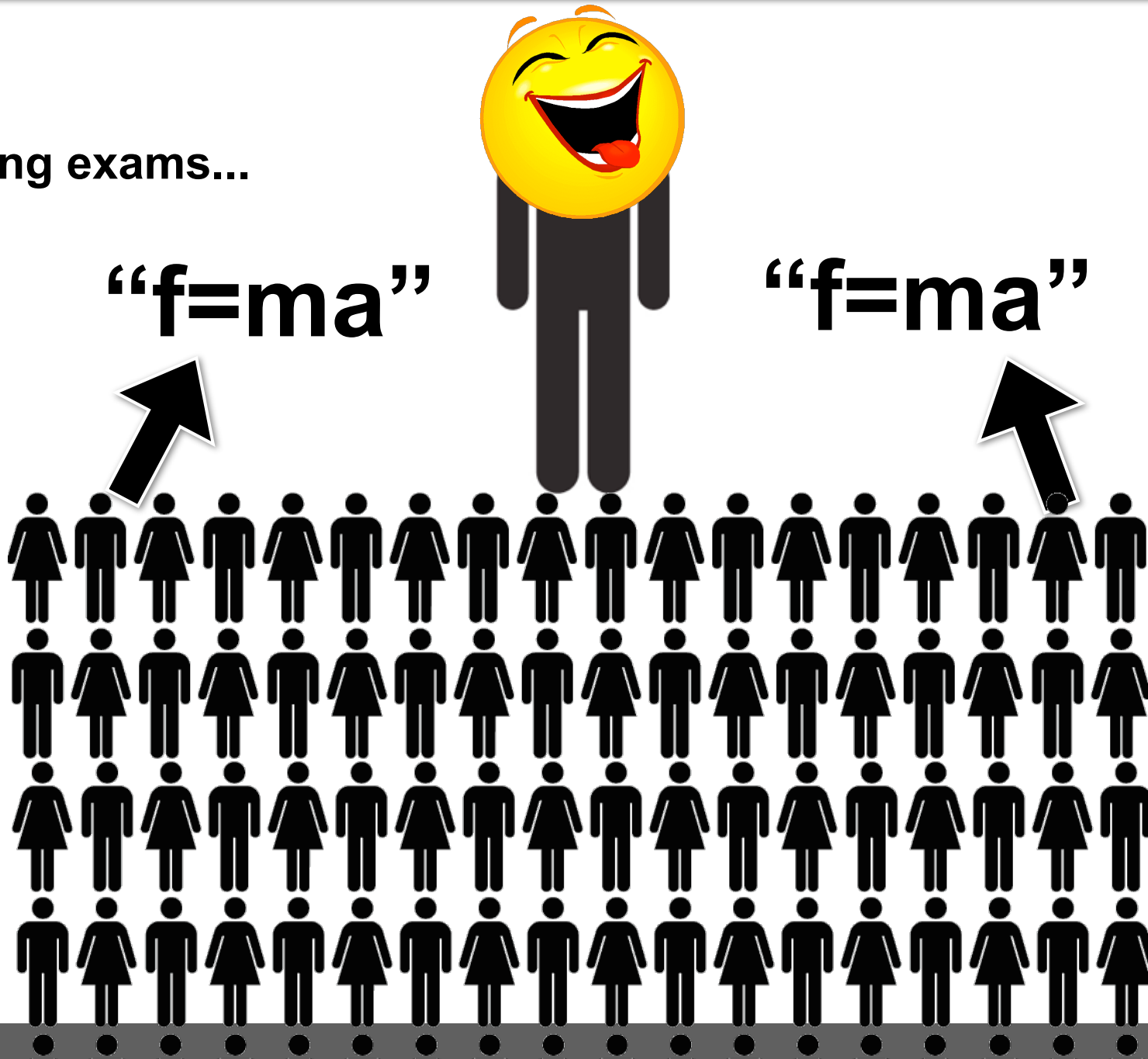
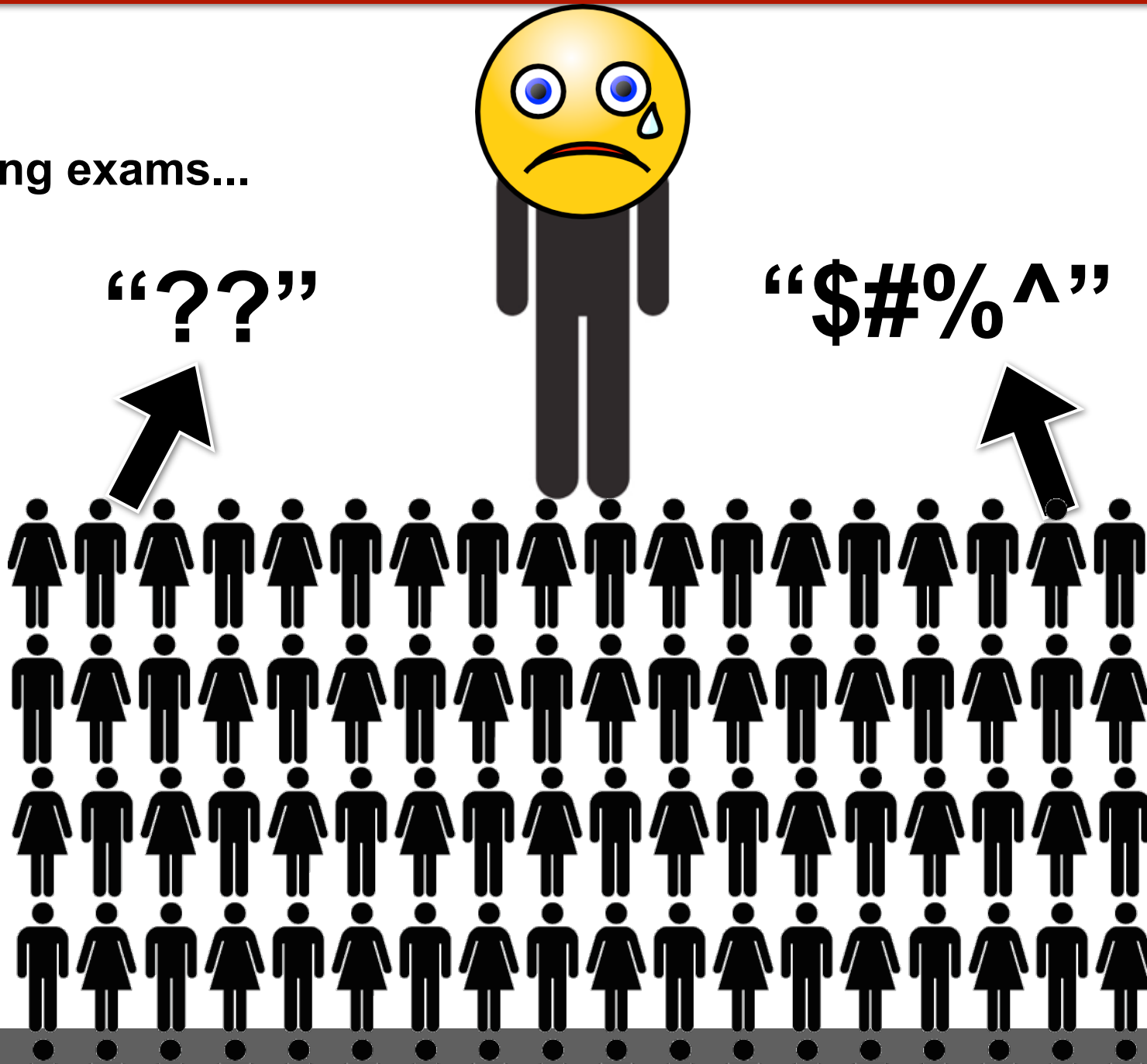# 3 Big Reasons to Rethink Evaluation

3 Big Reasons to Rethink Evaluation

During class...

"f=ma"

During exams...

"??"

"$#%^"

3 Big Reasons to Rethink Evaluation

During exams...

"f=ma"   "f=ma"
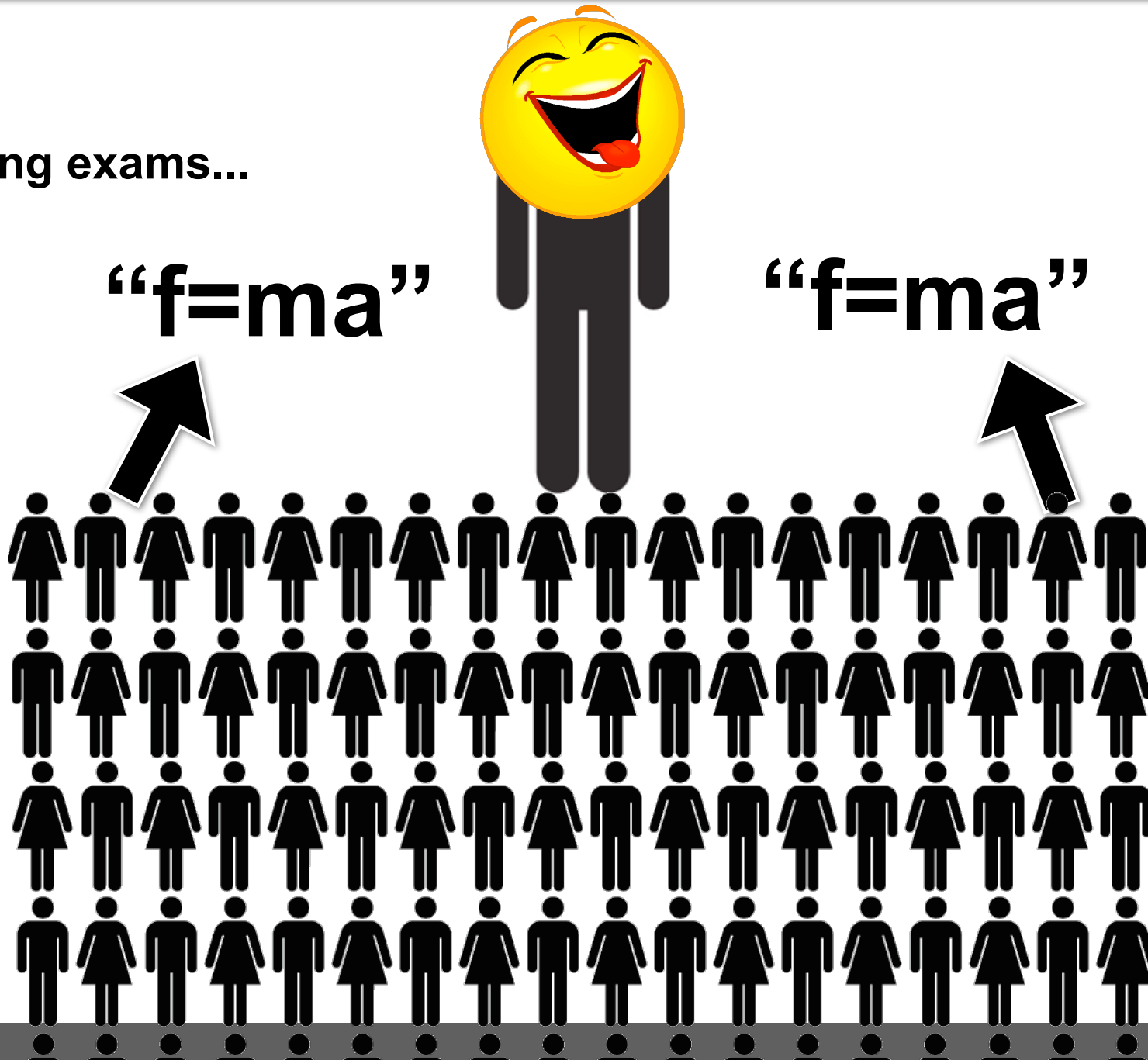
DECEPTIVE

Our methods of evaluation lure students and faculty into a false sense of security about the depth and quality of knowledge.

Why should I rethink evaluation?

Reason 2

Irrelevance

3 Big Reasons to Rethink Evaluation

To get from his high school to his home, Martin travels 5.0 km east and then 4.0 km north. When Veronica goes to her home from that same high school, she travels 8.0 km east and 2.0 km south.

What is the approximate measure of the shortest distances, between Martin's home and Veronica's home?

3 Big Reasons to Rethink Evaluation

To get from his high school to his home, Martin travels 5.0 km east and then 4.0 km north. When Veronica goes to her home from that same high school, she travels 8.0 km east and 2.0 km south.

What is the approximate measure of the shortest distances, between Martin's home and Veronica's home?

1. ~3 km
2. ~7 km
3. ~10 km
4. ~17 km

How do we usually ask students this question?

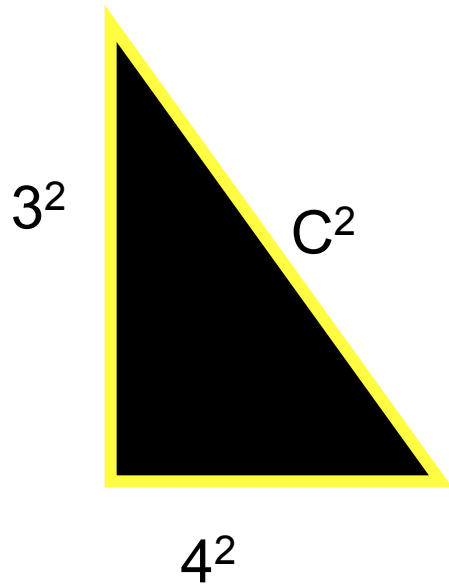What is the hypotenuse of this triangle?

3^2

C^2

4^2

To get from his high school to his home, Martin travels 5.0 km east and then 4.0 km north. When Veronica goes to her home from that same high school, she travels 8.0 km east and 2.0 km south.

What is the approximate measure of the shortest distances, between Martin's home and Veronica's home?
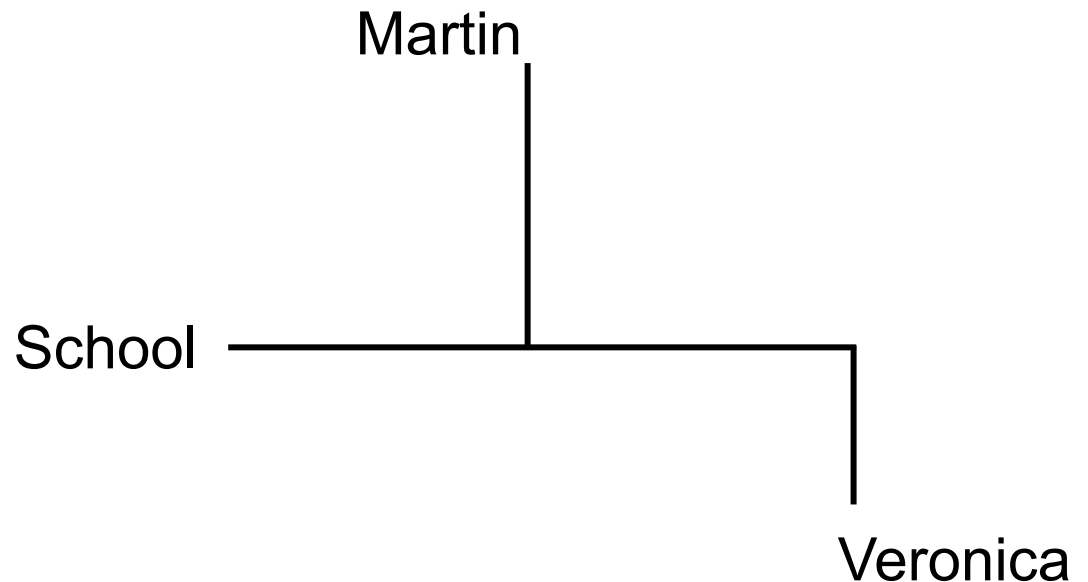
1. ~3 km
2. ~7 km
3. ~10 km
4. ~17 km

Martin

School

Veronica

To get from his high school to his home, Martin travels 5.0 km east and then 4.0 km north. When Veronica goes to her home from that same high school, she travels 8.0 km east and 2.0 km south.

What is the approximate measure of the shortest distances, between Martin's home and Veronica's home?
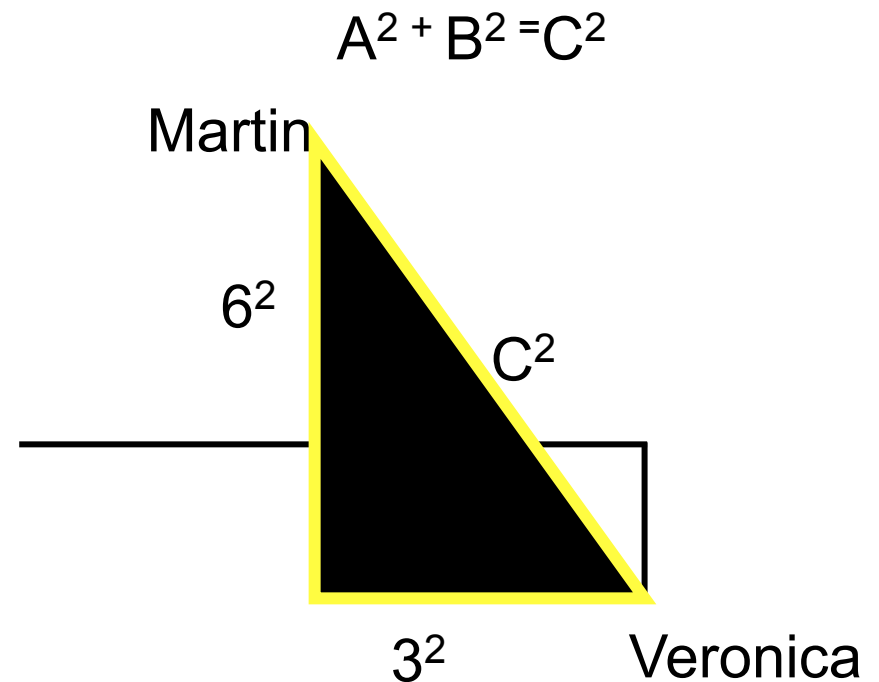
$A^2 + B^2 = C^2$

1. ~3 km
2. ~7 km
3. ~10 km
4. ~17 km

Martin

6^2

C^2

3^2 Veronica

We see....

$$A^2 + B^2 = C^2$$

3^2

C^2

4^2

IRRELEVANCE

Our methods of evaluation reward irrelevant rather than critical skills.

#1 skill we can teach students
to transfer knowledge to new contexts

Why should I rethink evaluation?

Reason 3

Restrictive

What skills does the traditional educational model develop?

- Memorization
- Fact recall
- Calculation

What skills do students' need in today's society?

- Self-monitoring
- Self-regulation
- Experimentation
- Perseverance
- Ability to apply or transfer knowledge
- Ability to fail

Example of Ability to Innovate

US Airways Flt 1549 15/1/2012

RESTRICTIVE

We restrict our students freedom to innovate with inauthentic evaluations

Why should we rethink evaluation?

Current approaches to evaluation

1) deceive faculty and students

2) develop irrelevant skills

3) restrict innovation

Why should we rethink evaluation?

Rethinking evaluation as a teaching tool is the single most important step we can take to improve student learning.*

*McClymer & Knowles, 1992

The concept you teach...

How well does your question measure authentic student learning of that concept?

1. Not at all
2. Somewhat (a little bit)
3. A sufficient amount (enough)
4. Very well

3 Big Reasons to Rethink Evaluation

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

Not at all	0	0%
Somewhat	11	41%
A sufficient amount	13	48%
Very well	3	11%
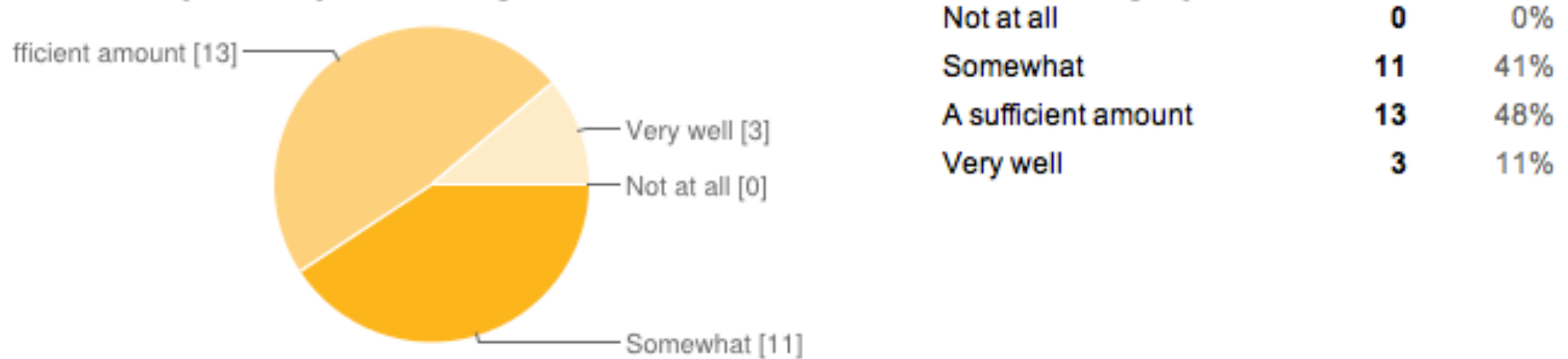
Outline

- 3 big reasons for rethinking evaluation

- Innovative evaluation techniques

- Best practices for evaluation design

Innovative Evaluation Techniques

Innovative evaluation techniques

#1: Classroom Response Systems

Innovative evaluation techniques

#1: Classroom Response Systems

Classroom response systems provide hundreds of opportunities for development of 1) student and faculty awareness and 2) relevant skills.
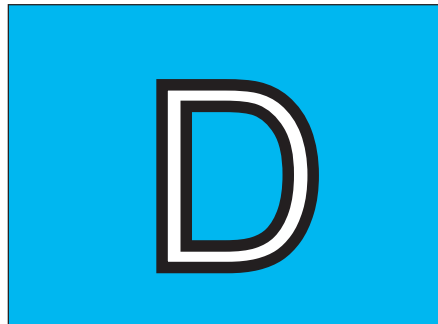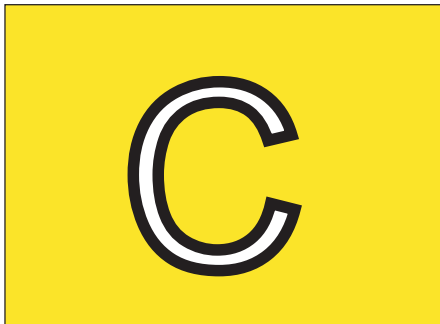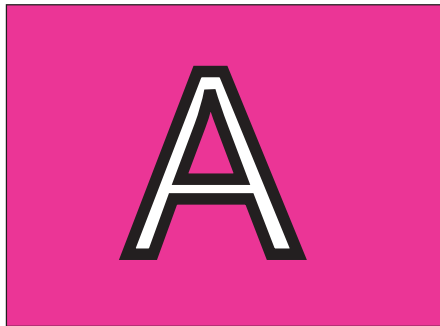
Innovative evaluation techniques

Polling

Checks for Opinions

I have used a clicker before?

1. Yes
2. No
3. I'm not sure

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems*

Innovative evaluation techniques

Polling	Recall
Checks for Opinions	Requires students to have memorized facts.

Tip - Bad clicker practice - only use to poll or ask fact recall questions*

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems, *Doug Duncan*

Innovative evaluation techniques

Polling	Recall	Conceptual
Checks for Opinions	Requires students to have memorized facts.	Requires students not only to recall information, but also to understand the concepts associated

Tip - Students like these kinds of questions best*

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems*, *Stephanie Chaasteen

Innovative evaluation techniques

Polling	Recall	Conceptual	Knowledge Transfer
Checks for Opinions	Requires students to have memorized facts.	Requires students not only to recall information, but also to understand the concepts associated	Requires students to apply their knowledge and understanding to particular situations and contexts

Tip: Key to developing innovators

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems, *Stephanie Chaasteen*

Innovative evaluation techniques

Polling	Recall	Conceptual	Knowledge Transfer	Prediction
Checks for Opinions	Requires students to have memorized facts.	Requires students not only to recall information, but also to understand the concepts associated	Requires students to apply their knowledge and understanding to particular situations and contexts	Requires students to predict the outcome of an experiment or situation.

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems, *Stephanie Chaasteen*

Innovative evaluation techniques

Prediction

Predict the percentage of people here who will actually change their approach to evaluation?

1. <10%

2. 11-25%

3. 26-75%

4. 75%+

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems*

Innovative evaluation techniques

Polling	Recall	Conceptual	Knowledge Transfer	Prediction	Discussion
Checks for Opinions	Requires students to have memorized facts.	Requires students not only to recall information, but also to understand the concepts associated	Requires students to apply their knowledge and understanding to particular situations and contexts	Requires students to predict the outcome of an experiment or situation.	To engage students in discussion - no need for right or wrong answers.

Innovative evaluation techniques

Exercise....
Think of a concept or topic that your students have difficulty with. *Write a RECALL question about that concept.*   Example: Which of the following is one of the big reasons for changing our approach to evaluation? 1. Irrelevance 2. Inappropriate 3. Disruptive 4. I don't know

Reference: Derek Bruff and others, *Teaching with Classroom Response Systems, *Stephanie Chaasteen*

Innovative evaluation techniques

Innovative evaluation techniques

#2: Rubrics

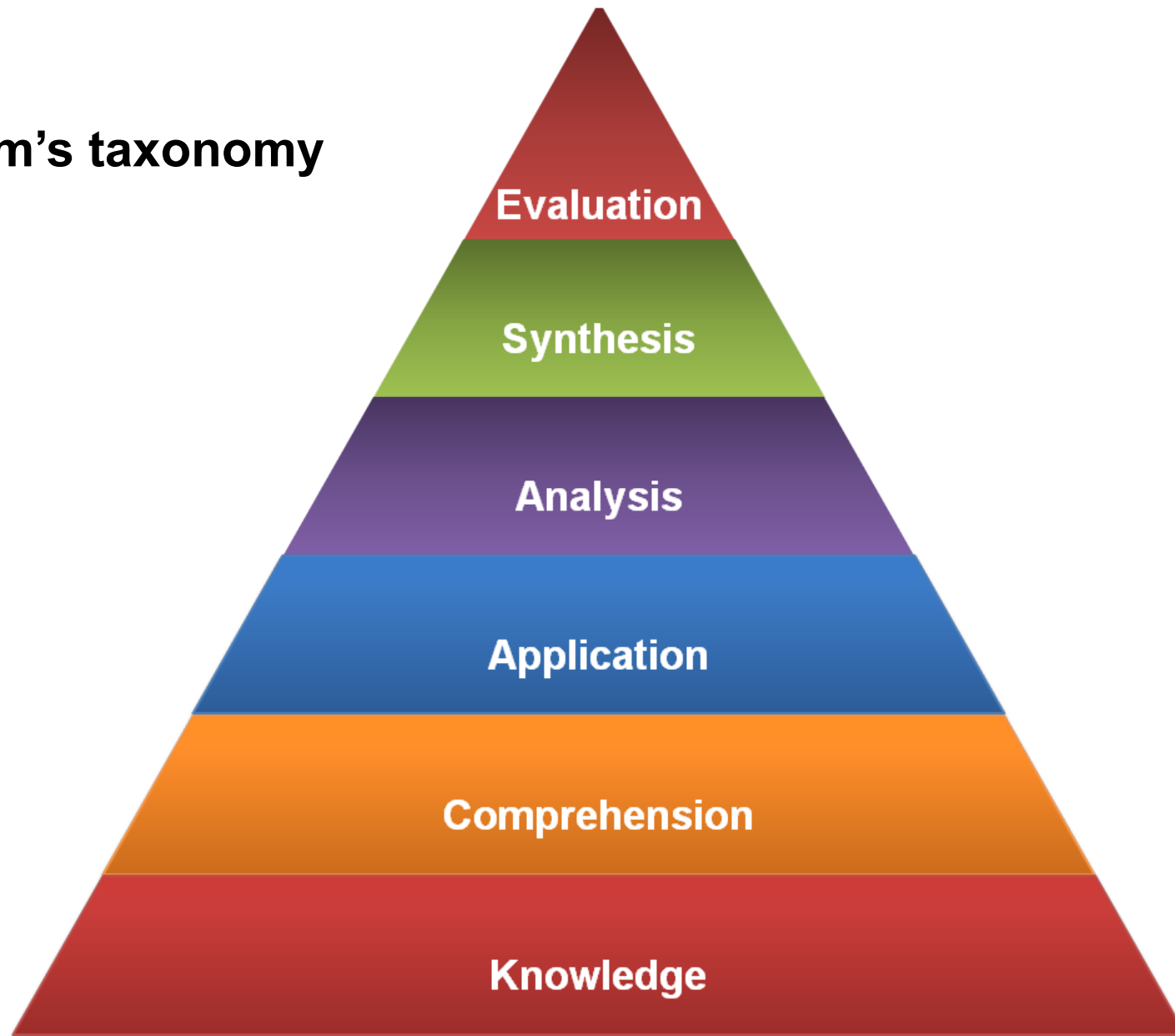*Student success relies on explicit signaling of expectations.*

Rubrics are scoring tools that signal expectations to students.

Rubrics 1) Help students engage in relevant skills (peer and self assessment) and 2) provide faculty and student awareness

0 Incomplete	1 Novice	2 Developing	3 Competent	4 Expert
		Rubric		

Innovative evaluation techniques

Exercise....
Re-write your RECALL question targeting a higher level of Bloom's.....

Critique, judge, justify

Evaluation

Make new meaning

Synthesis

Compare, Distinguish

Analysis

Infer, Show, Use

Application

Conclude, Define, Explain

Comprehension

List, Locate, Name, Recognize

Knowledge

Innovative evaluation techniques

	0 Incomplete	1 Novice	2 Developing	3 Competent	4 Expert
Question	No question provided	Requires student to produce facts only	Requires student to make inferences or use knowledge	Requires students to compare or contrast meaning	Requires students to make judgments or critique

Innovative evaluation techniques

0 Incomplete	1 Novice	2 Developing	3 Competent	4 Expert

Innovative evaluation techniques

Rubric Tips-

- *Always give the students a form of the rubric ahead of time*

- *Make as simple as possible*

- *Have students engage in self and peer evaluations using rubrics to develop self and peer assessment abilities*

Innovative evaluation techniques

Rate your confidence......

I can design a multi-level rubric

0-I am not sure what this is

1-extremely unconfident

2-somewhat unconfident

3-somewhat confident

4-extremely confident

Innovative evaluation techniques

Please rate your confidence in your ability to DO the following things: - I can design a multi-level rubric

0 (I am not sure what this is, but I look forward to learning about)

1 (Extremely unconfident)

2 (Somewhat unconfident)

3 (Somewhat confident)

4 (Extremely confident)

Innovative evaluation techniques

http://www.introductiontorubrics.com/

Innovative evaluation techniques

All techniques

1. are research-based
2. can be implemented without any cost or advanced resources
3. are grounded in science on how students' learn best

Innovative evaluation techniques

Use formative evaluation to build skills, so students can transfer what they know to succeed on summative evaluations and more complex problems.

Which of the following is one of the 3 Big Reasons I presented that the beginning of this talk for changing our approach to evaluation?

1. Inappropriate

2. Deceptive

3. Disruptive

4. I don't know

Innovative evaluation techniques

#3: Just-in-Time teaching

Just-in-Time Teaching

A technique for flipping your classroom and....

1) Helping students engage in relevant skills (critical reading and self-monitoring)

2) providing faculty and student awareness

Innovative evaluation techniques

The majority of my students read before class.

1. Always
2 Sometimes
3. Never
4. I don't know

Innovative evaluation techniques

The amount of time I wish my students would read before class....

1. Always
2 Sometimes
3. Never
4. I don't know

Innovative evaluation techniques

I am confident I can motivate my students to do their readings....

1. Not at all confident
2 Somewhat confident
3. Confident

Innovative evaluation techniques

Using Just-in-Time Teaching

Percent of Harvard Students completing at least 3/4 of Reading Assignments in Physics	87%
% of University of Edinburgh completing all Reading Assignments in Physics	82%+

Innovative evaluation techniques

topic 1
reading assigment

Innovative evaluation techniques
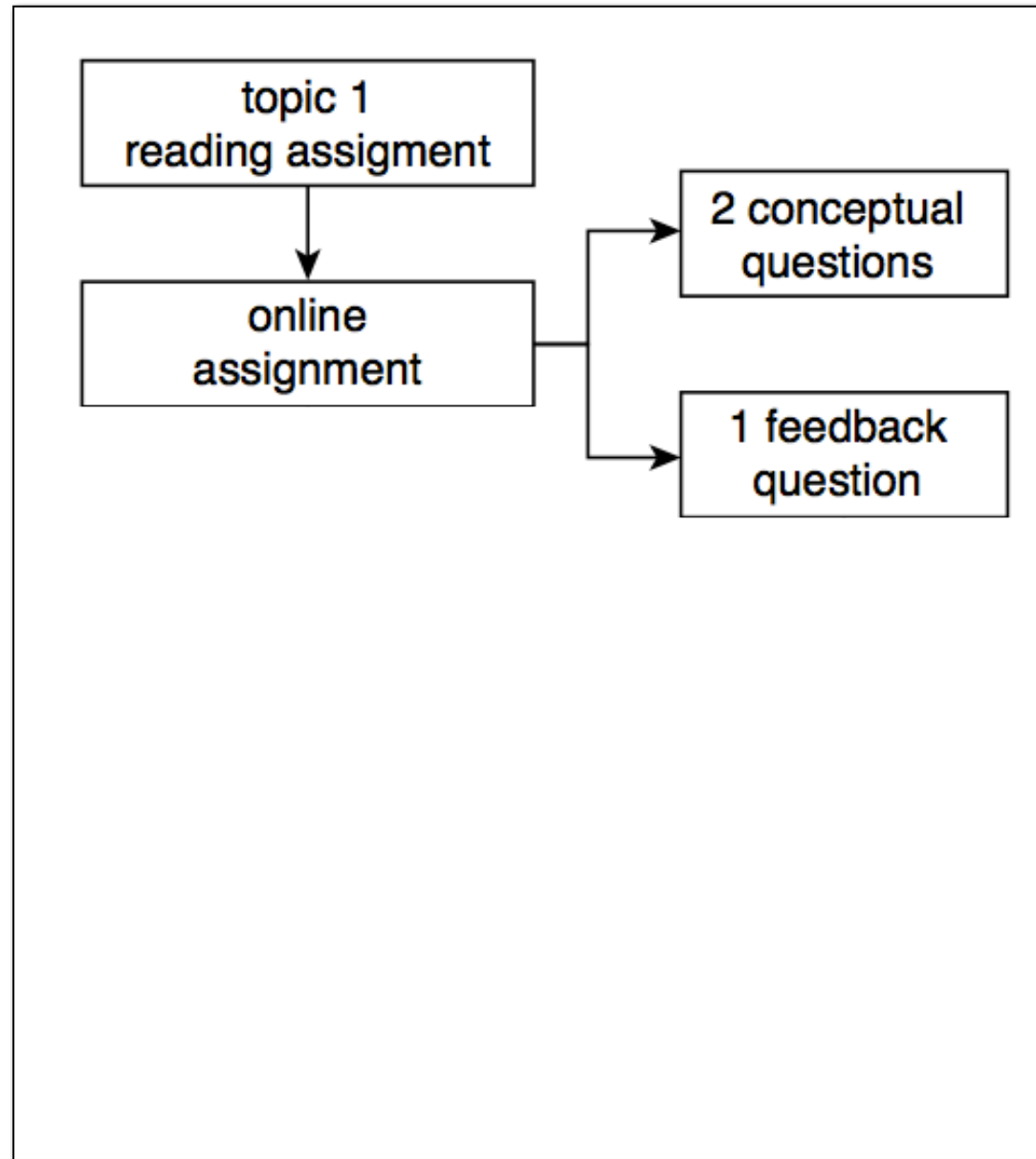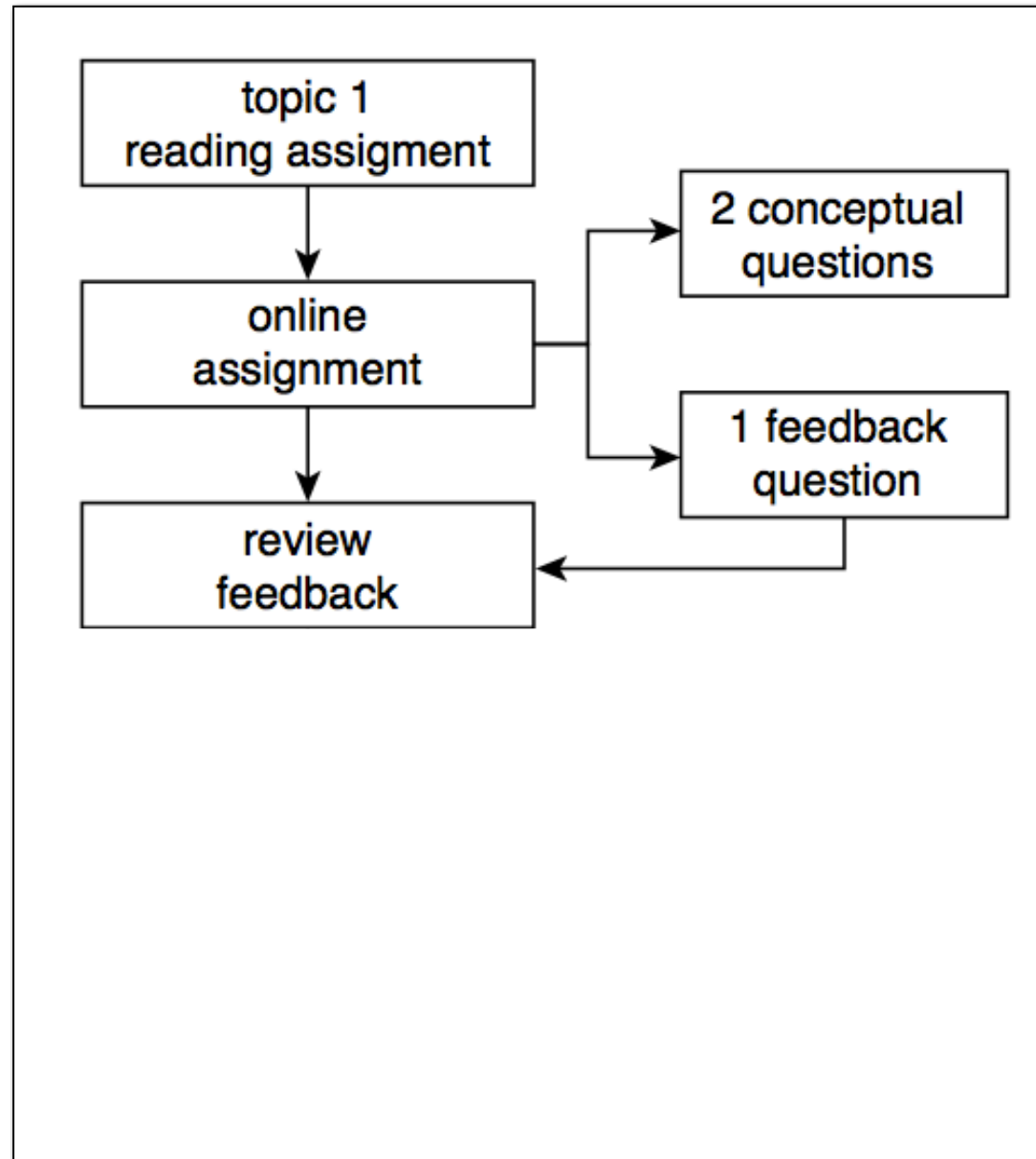
Innovative evaluation techniques
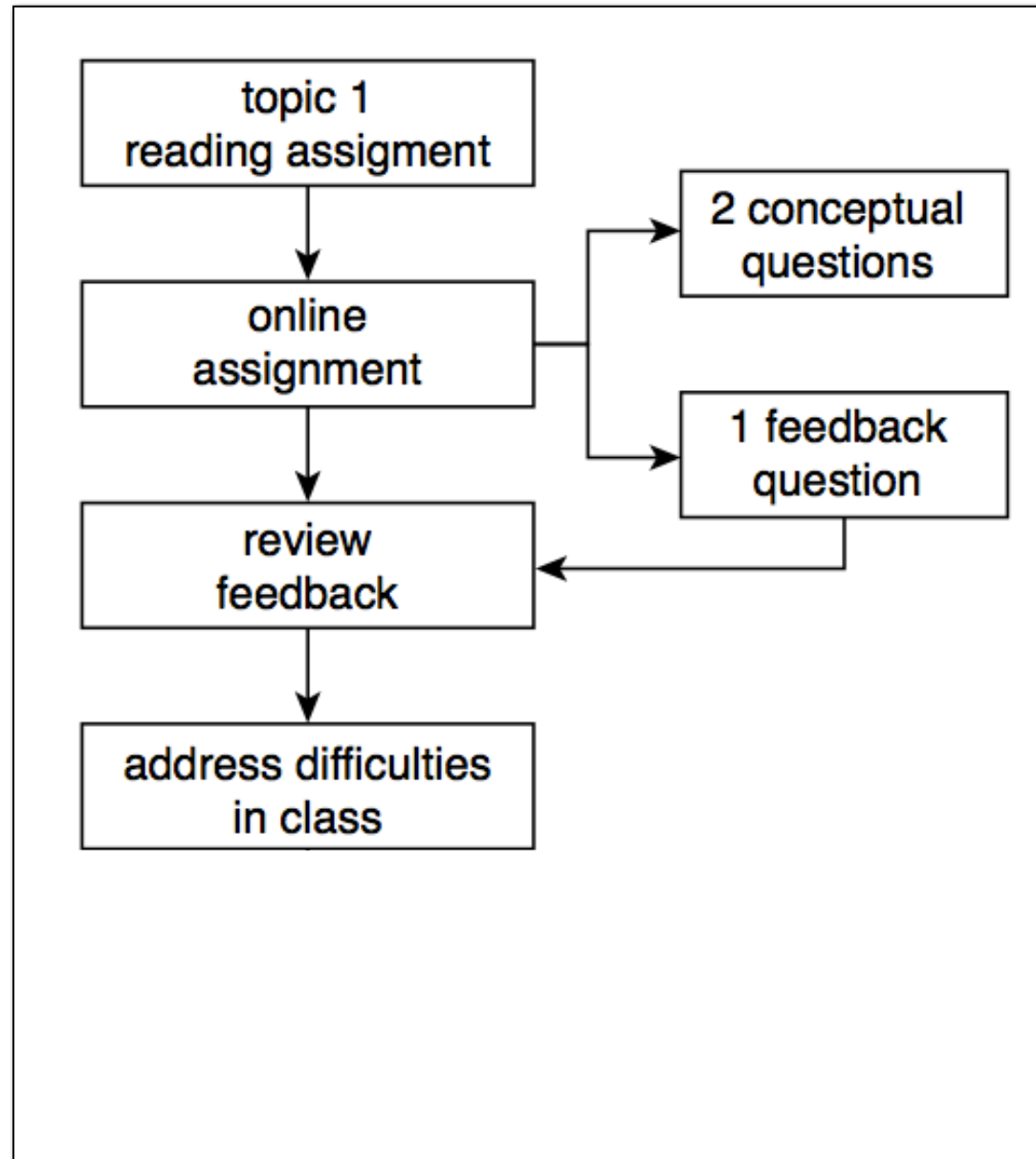
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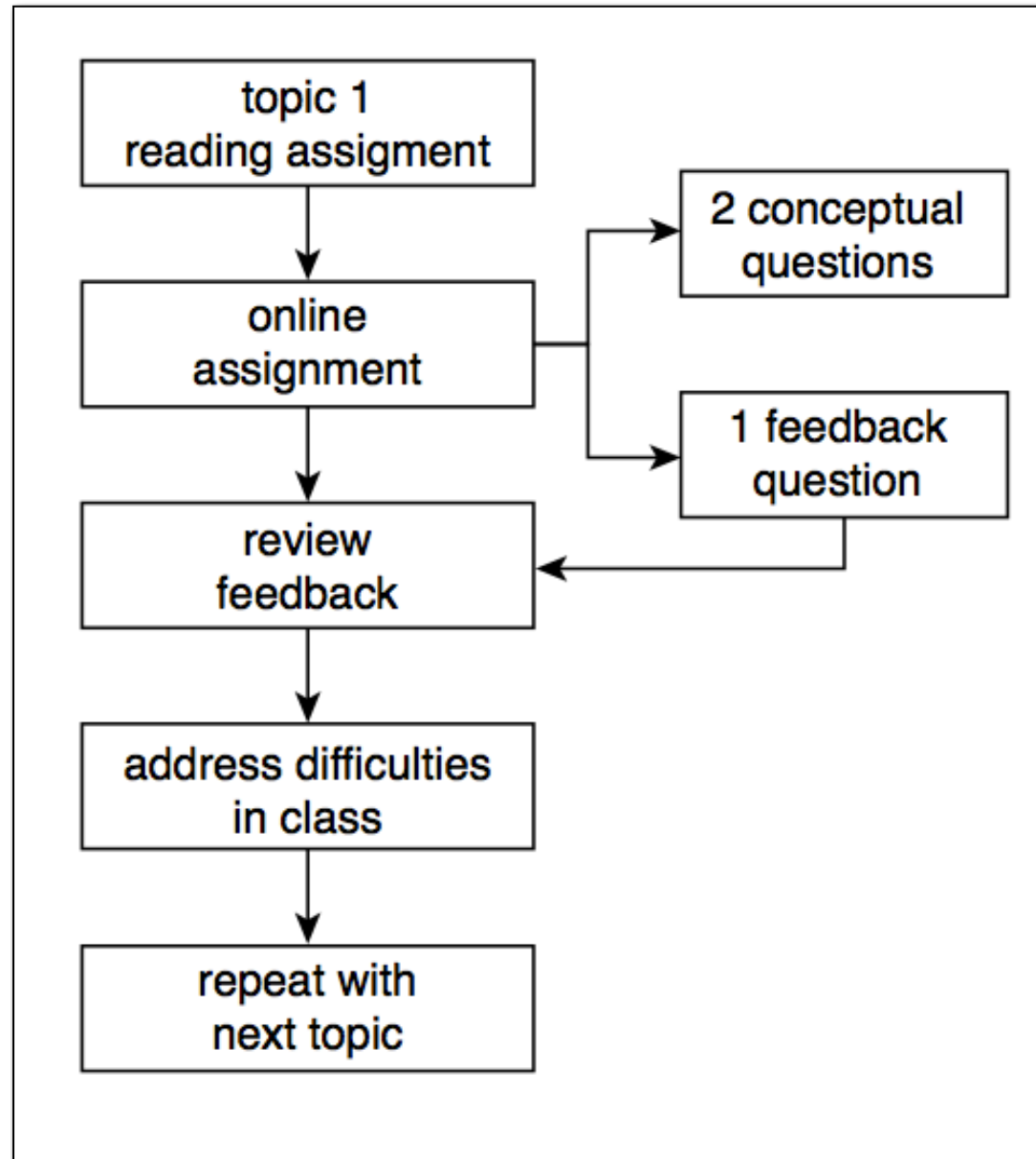
Innovative evaluation techniques
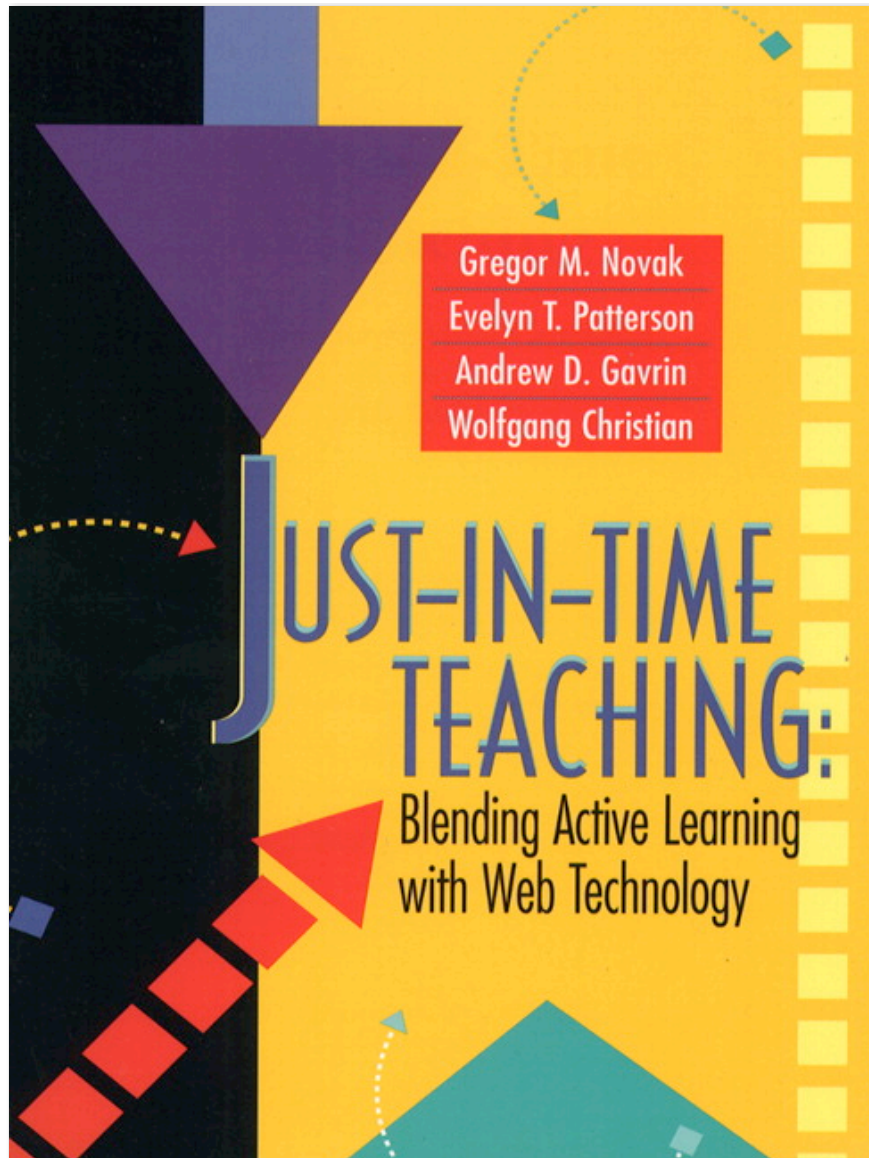
www.jitt.org

Innovative evaluation techniques

What is the most important thing you just learned about JiTT?

What did you find most confusing about JiTT?

Innovative evaluation techniques

#4: One minute paper

One-minute paper simplest and most powerful technique to develop 1) student and faculty awareness and 2) relevant skills for students.

Innovative evaluation techniques

1. What is the most important thing you learned today?

2. What did you find most confusing or most difficult?

Innovative evaluation techniques

A review of the one-minute paper

David R. Stead[1]

[+] Author Affiliations

Abstract

Lecturers who use the 'one-minute paper' generally praise it as a learning tool, for the teacher as well as the students. This article surveys the literature on this widely applicable technique and presents new evidence on students' opinions of it and the extent of its use in the classroom. The benefits for both students and teachers appear sizeable for such a modest amount of time and effort, and students generally perceive the one-minute paper favourably. However, the one-minute paper can be easily employed to excess, reflected in quickly declining response rates over the course of two lecture series. Survey evidence suggests that the one-minute paper is perhaps not used especially extensively in UK and US higher education, largely due to lack of knowledge of its existence and the perception that it would be too time-consuming to analyse the responses.

"The benefits for both students and teachers appear sizeable for such a modest amount of time and effort, and students generally perceive the one-minute paper favourably."

*UbD, 2005
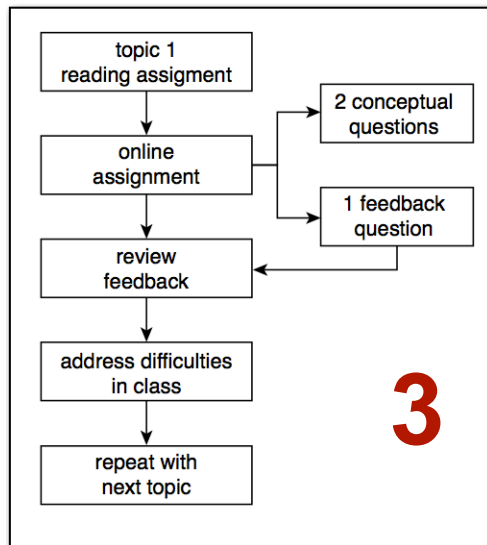
4 techniques

Current approaches to evaluation

1) deceive faculty and students

2) develop irrelevant skills

3) restrict innovation

4 powerful innovative evaluation techniques

1

| 0 Incomplete	1 Novice	2 Developing	3 Competent	4 Expert
		2		

topic 1 reading assigment

online assignment

2 conceptual questions

1 feedback question

review feedback

address difficulties in class

3

repeat with next topic

4

Outline

- 3 Big reasons for rethinking evaluation
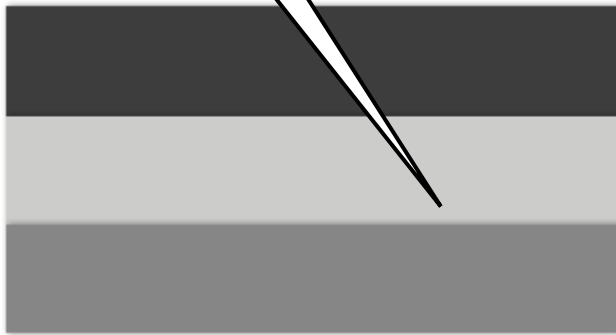
- Evaluation enhanced-learning techniques
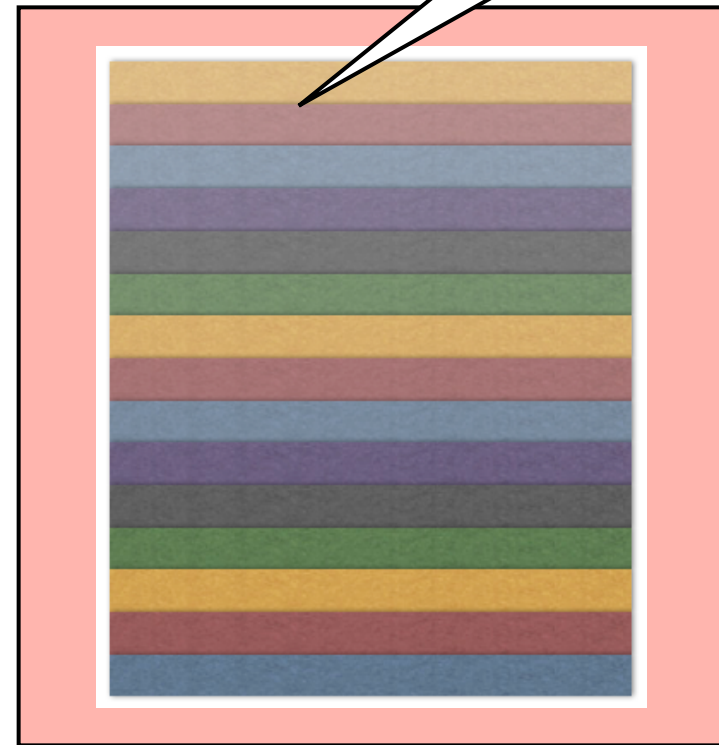
- Best practices for evaluation design

Best practices for evaluation design

- separate from teaching & learning
- periodic
- late
- unidimensional
- not authentic
- homogenous
- vague
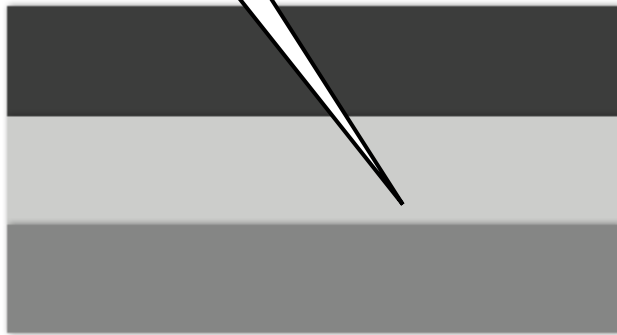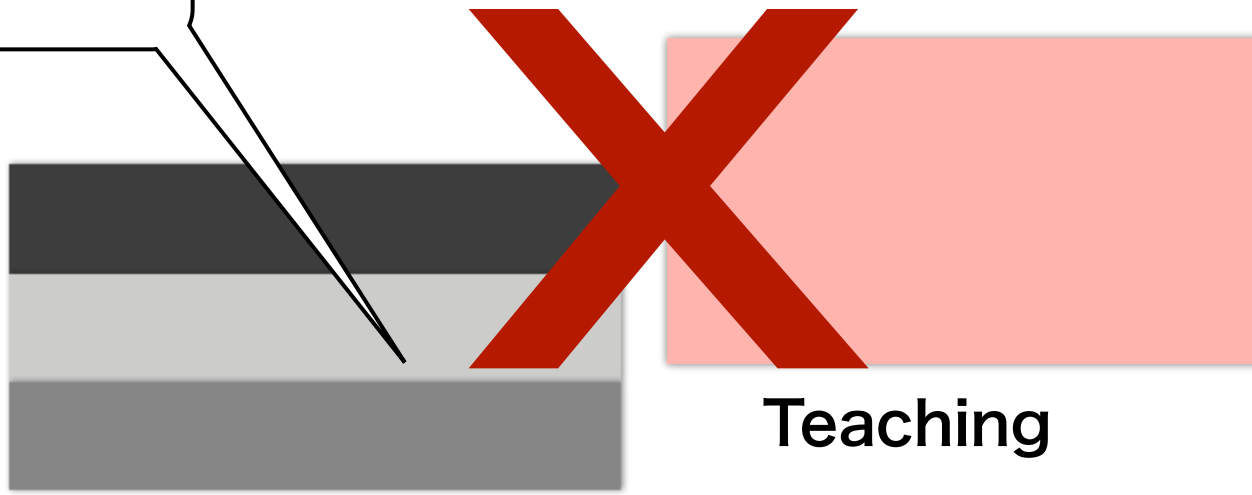
Traditional evaluation

Teaching

Best practices for evaluation design

Traditional evaluation

Innovative Evaluation

Really want to improve your teaching?

Stop lecturing.

Start evaluating.

Turn to Your Neighbor
The Official Peer Instruction Blog

blog.peerinstruction.net

scholar.seas.harvard.edu/schell
@julieschell