

Metacognition

Shane Hall, Teaching Effectiveness
Program
Spring 2015

Workshop Goals:

- You will be able to design activities and assignments that enhance student's metacognitive skills and integrate them into your teaching.

What is "metacognition?"

- We'll get back to this.

What is the most important skill you want your students to learn?

- Write down top three answers (individually).

Skills we wish to
teach?

Between 90-99% of faculty rate
"critical thinking" essential, if not
the most essential, thing to teach.

De Angelo and Hurtado et al
(2009).

So what is
"metacognition?"

- Told you we'd come back.

Definitions:

The ability to "understand and monitor one's own thoughts and the assumptions and implications of one's activities"

(Lin 2012)

"thinking about one's own thinking"

(Cooper and Sandi-Urena 2009)

Metacognition

a form of critical thinking
or a tool for learning how to think critically

Knowledge of
Cognition



Ability to...
Observe, recall,
analyze, associate, etc.



Regulation
of Cognition



Planning



Monitoring



Evaluating

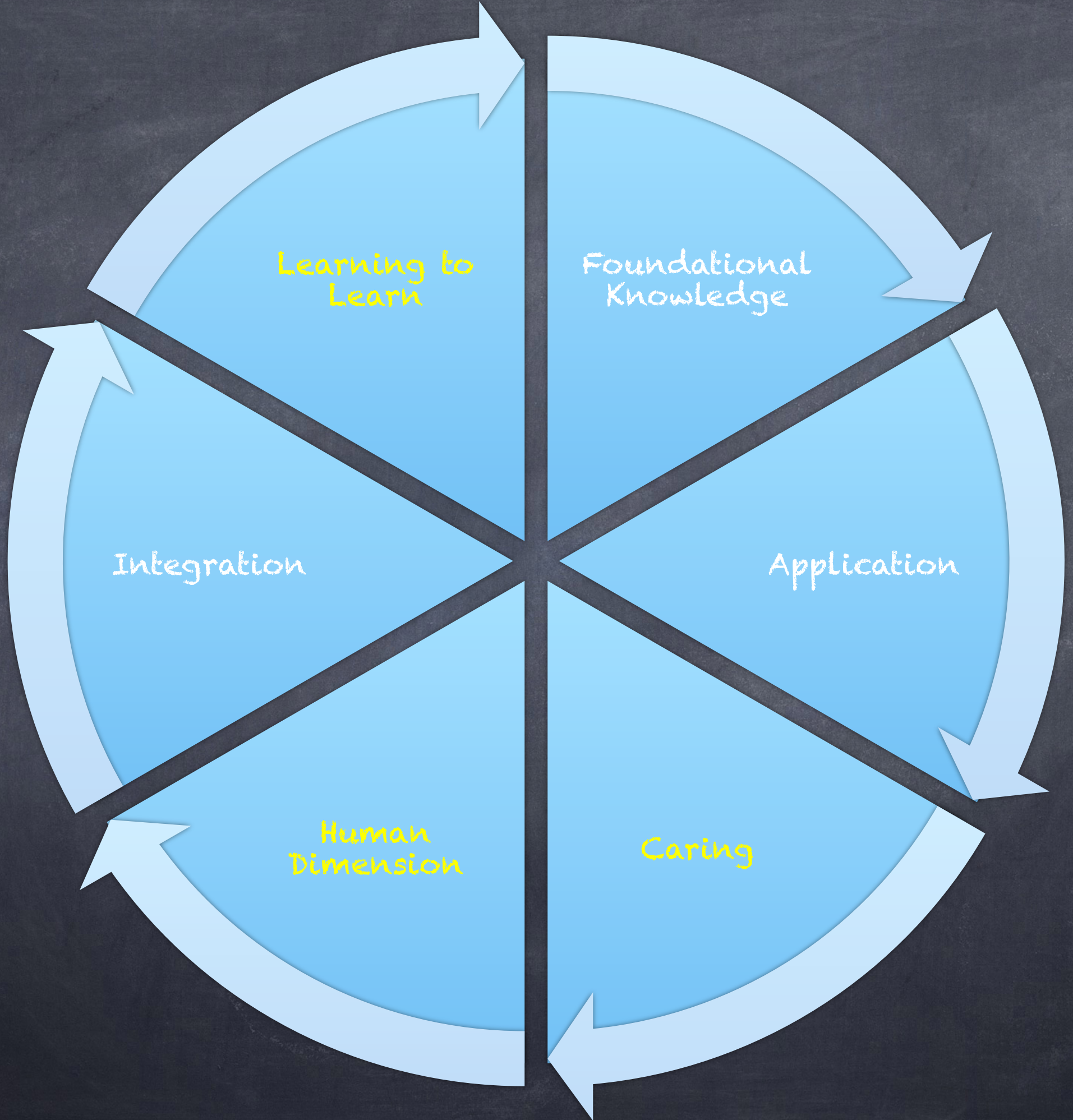
Metacognition

Elements of Metacognition

Why teach metacognition?

Studies indicate that students who engage in metacognitive exercises **improve** their exam performance, written or designed products, and problem-solving ability.

Metacognition helps students improve their sense of **self efficacy and independent agency**, which in turn motivates students to learn.



Learning to Learn

Foundational Knowledge

Application

Caring

Human Dimension

Integration

Implications for education:

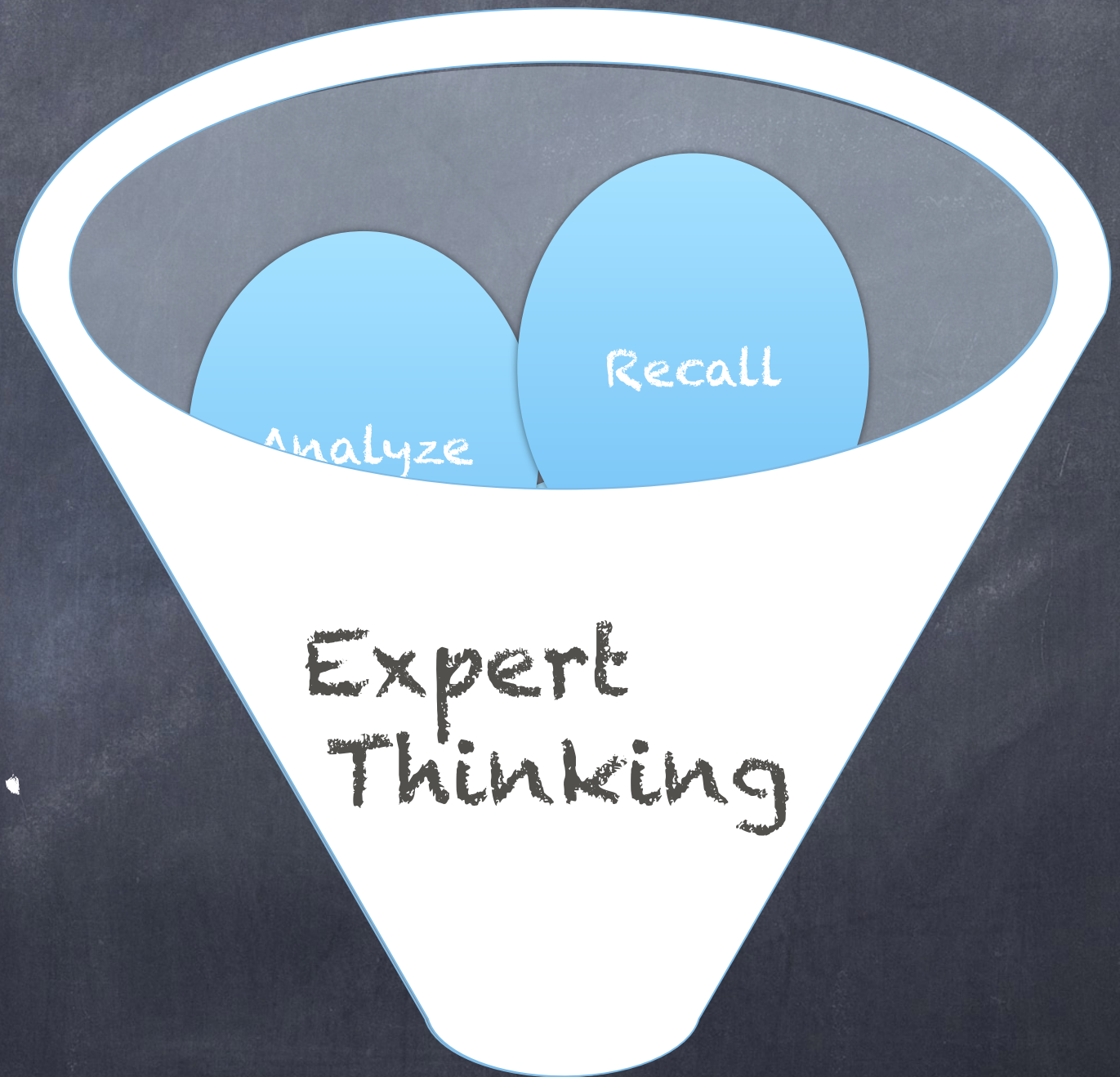
- Instructors can encourage students to become independent learners.
- Metacognitive strategies and practices can be taught!

So let's start
practicing

What is one basic
form of critical
thinking a beginner
needs to learn in
your field?

"Think-Aloud"

Instructor models thinking process for students when confronting a problem or performing a task.



Problem Solved!

There will come Soft Rains

Sara Teasdale 1920

(War Time)

**There will come soft rains and the smell of the ground,
And swallows circling with their shimmering sound;**

**And frogs in the pools singing at night,
And wild plum trees in tremulous white,**

**Robins will wear their feathery fire
Whistling their whims on a low fence-wire;**

**And not one will know of the war, not one
Will care at last when it is done.**

**Not one would mind, neither bird nor tree
If mankind perished utterly;**

**And Spring herself, when she woke at dawn,
Would scarcely know that we were gone.**

Practice Think Alouds

- Pair-up with a partner.
- One partner will be our "expert" and the other the "listener."
- **Expert:** take the basic form of critical thinking in your field from before, and "think aloud" how you do this form of thinking.
- **Listener:** help the expert by asking questions on how they are going about this task.

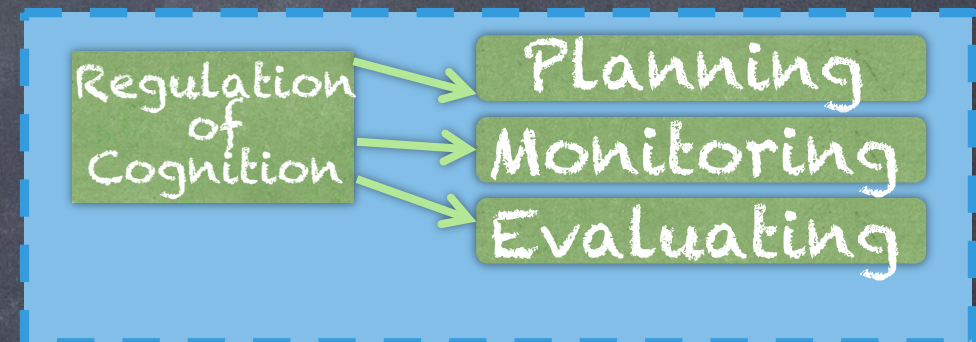
How did it go?

1st N.B. It's tough to do these on the spur of the moment, but valuable to be able to do so.

2nd N.B. What I like about "Think Alouds" is their scalability.

Shift to Self-Regulated Learning

- Metacognitive awareness/skills
- Self-assessment of learning
- Self-directed learning
- Self-monitored learning
- Reflection on learning



PLUS:

- Attributing success/failure to own study habits and efforts

When do we use self-regulating skills?

Adapting

Planning

Planning:
Beginning

Monitoring:
During

Evaluating:
After

Evaluating

Monitoring

Activities and Assignments

Start of Term:

- Pre-Class Knowledge Surveys
- Intro essays or discussions
- Metacognitive Activities Inventories

Knowledge Surveys

- Series of questions or tasks covering the material of an entire course or unit (from exercises, old exams, etc.)
- Answer ascertains *students' perceived ability* to answer each question or perform each task
- Questions should survey different kinds of thinking

Sample Knowledge Survey Questions

- State Newton's Laws of Motion.
(knowledge/recall)
- Translate this passage into French.
(comprehension)
- Apply Archimedes Principle to measure the volume of this irregularly shaped object.
(application)

Knowledge Survey

Sample Answers

- a) I do not understand the question, I am not familiar with the terminology, or I doubt that I can answer the question well enough to earn a passing grade.
- b) I understand the question and 1) I think I can answer at least half of it correctly, or 2) I know where I can find the correct answer within 20 minutes.

Intro essay prompts:

- "How I earned an A in this course"
- "What obstacles will I overcome learning in this course? How will I do so?"
- "Why is taking this course important to me?"

Intro class discussions

- Lots of options... has anyone led a discussion about how learning works in class?

Metacognitive Activities Inventory

- For problem-solving: Cooper & Sandi-Urena, 2009. Available at <http://pubs.acs.org/doi/abs/10.1021/ed086p240>
- Any discipline: Schraw & Dennison, 1994. (put in scholar.google.com)

Any other start-of-
term activities?

Activities and Assignments

Middle of Term:

- Wrappers
- Learning Logs/ Course Journals

Lecture Wrappers

- Tell students to listen actively for key points and take notes. At the end, they write the 3 most important points at the end of their notes. You reveal the 3 most important points. Students self-assess their listening.
- - 1st → 3rd time: 45% → 75% of students correct (Loveitt, 2008)
- Minute Papers (reactions, reflections)
- Gots/Needs or Clearest/Muddiest

Exam Wrappers

Give students a chance to reflect on their exam performance and study habits.

Have students respond to wrapper prompts directly before or after an exam.

You can ask follow up questions after the exam is returned, graded.

Sample Physics Exam Wrapper (Kaplan et al)

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

- What percentage of your test-prep time was spent in each of these activities:
 1. Reading textbook for the first time
 2. Rereading textbook section.

Sample ctd.

- Reviewing homework solutions
- Solving problems for practice
- Reviewing your own notes
- Reviewing materials from course website
- Meeting with GTF or Instructors.
- Meeting with peers.

Sample AFTER grades:

- Now that you've looked over your graded exam, estimate the percentage of points you lost due to each of the following:
 - Lack of understanding
 - Running out of time
 - Not knowing how to approach problem
 - Difficult terminology or concepts.

Wrap everything!

- For the sake of time, we're skipping reading wrappers, and discussion wrappers, but you can pretty much add a metacognitive wrapper to everything.

Learning Logs:

- Students regularly journal in response to metacognitive questions.

Learning Log

sample questions:

- Of this week's readings, which was your favorite, and why?
- At what point during this week (class or homework) did you feel most excited and engaged? Why?
- Identify one opinion of yours that you've had challenged or questioned during the past week.

Midterm Surveys

- ANONYMOUS
- Structure self and course reflection
- Honor student agency in adapting to comments

Activities and Assignments

End of Term:

- Reflective essays
- Revisit start of term activities

Reflective Essays

- Letter to former self
- Letter to next cohort of students
- Letter to future self
- Learning manifesto!

Let's talk grading:

A+

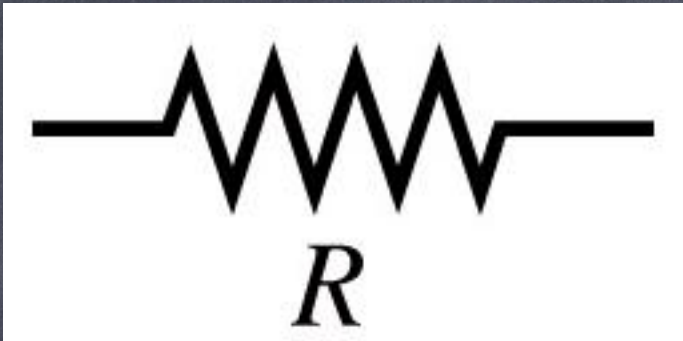
How do we value these activities?

Do we give grades? Credit?

Let's talk student resistance



Let's talk about
our resistance.



Questions?

- Contact shaneh@uoregon.edu
- Or tep@uoregon.edu

Workshop Follow Up

- I'll email everyone who signed in on the list additional resources.
- I'll also ask for feedback on this workshop. It's much appreciated!
- TEP is always happy to meet and talk! Contact us at tep@uoregon.edu