Scientists Engaged in Education Research

UNIVERSITY OF GEORGIA

# Spring workshop series: Classroom observations

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**On a notecard: Write down one question you have about classroom observations.**

# Learning objectives

- By the end of this workshop, you should be able to:
  - List reasons why a researcher would use classroom observations to collect data
  - Contrast some commonly used observation protocols
  - Consider a research question and context and make a reasoned argument for using a specific protocol
  - Identify some of the challenges of reliably observing classrooms

# Some additions for future workshops

- It was fun to have the research in education seminar with you. I normally take my time before providing feedback because I really like to think about the classes. I really liked how you set the class up and the topics you covered. I think I understand that the different protocols we discusses are the most commonly used and which one you use depend in the question you are asking. However, I somehow remember hearing you say that one of them was the first one and now it is not very much used. So my feedback/question would be if you could emphasize a bit more if out of them one or two are the most used at the moment.
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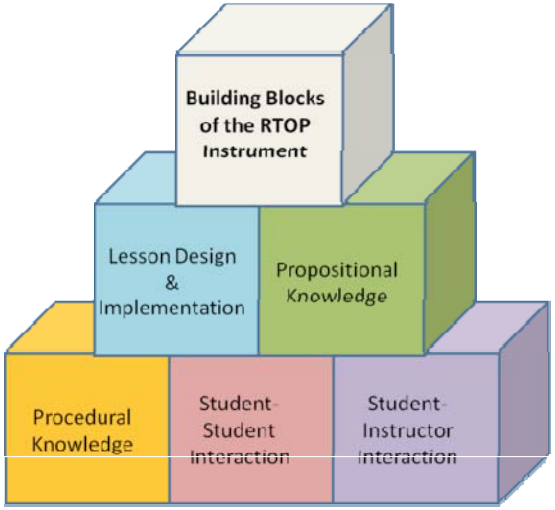
# Data collection in biology education research

- Surveys
- Testing
- Interviewing
- Classroom observations

# Why classroom observations?

# How do you conduct a classroom observation?




# Classroom observation protocols

- Protocols allow observation data to be collected systematically

- A lot goes on in a classroom
  - Student behavior
  - Instructor behavior
  - Interactions among students and between the instructor and students
  - Visual aids
  - Audio

# Deciding to use classroom observations

# Answer these questions about your protocol. Be prepared to report out.

- What is being observed?
- What will the researcher record while observing?
- What will the data that ultimately produced look like? (i.e., what would you report in a manuscript)
- How hard do you think it will be for two people to independently record the same data?
- Will it be possible to use the protocol in person, with video?
- It is not unusual for teachers who are observed to want some data or feedback from the process. Imagine observing a friend. Would you feel comfortable reporting the results of this observation to him or her?
- What strengths and weaknesses do you see with this protocol?

# COPUS (Classroom Observation Protocol for Undergraduate STEM)

**Observation codes**

**1. Students are Doing**

| | |
|---|---|
| **L** | Listening to instructor/taking notes, etc. |
| **Ind** | Individual thinking/problem solving. Only mark when an instructor explicitly asks students to think about a clicker question or another question/problem on their own. |
| **CG** | Discuss clicker question in groups of 2 or more students |
| **WG** | Working in groups on worksheet activity |
| **OG** | Other assigned group activity, such as responding to instructor question |
| **AnQ** | Student answering a question posed by the instructor with rest of class listening |
| **SQ** | Student asks question |
| **WC** | Engaged in whole class discussion by offering explanations, opinion, judgment, etc. to whole class, often facilitated by instructor |
| **Prd** | Making a prediction about the outcome of demo or experiment |
| **SP** | Presentation by student(s) |
| **TQ** | Test or quiz |
| **W** | Waiting (instructor late, working on fixing AV problems, instructor otherwise occupied, etc.) |
| **O** | Other – explain in comments |

**2. Instructor is Doing**

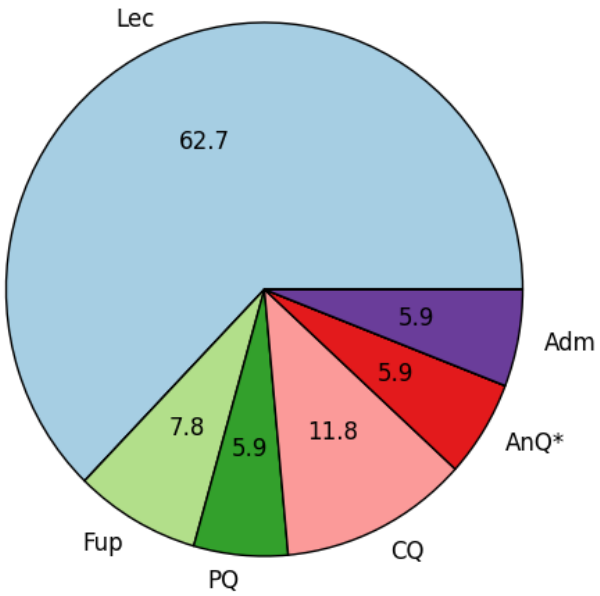
| | |
|---|---|
| **Lec** | Lecturing (presenting content, deriving mathematical results, presenting a problem solution, etc.) |
| **RtW** | Real-time writing on board, doc. projector, etc. (often checked off along with Lec) |
| **FUp** | Follow-up/feedback on clicker question or activity to entire class |
| **PQ** | Posing non-clicker question to students (non-rhetorical) |
| **CQ** | Asking a clicker question (mark the entire time the instructor is using a clicker question, not just when first asked) |
| **AnQ** | Listening to and answering student questions with entire class listening |
| **MG** | Moving through class guiding ongoing student work during active learning task |
| **1o1** | One-on-one extended discussion with one or a few individuals, not paying attention to the rest of the class (can be along with MG or AnQ) |
| **D/V** | Showing or conducting a demo, experiment, simulation, video, or animation |
| **Adm** | Administration (assign homework, return tests, etc.) |
| **W** | Waiting when there is an opportunity for an instructor to be interacting with or observing/listening to student or group activities and the instructor is not doing so |
| **O** | Other – explain in comments |

# COPUS (Classroom Observation Protocol for Undergraduate STEM)

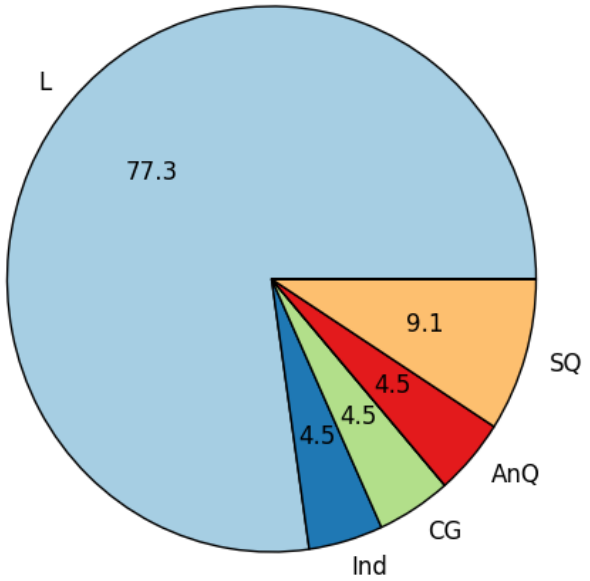
- What is being observed?
  - teacher AND student behavior
- What will the researcher record?
  - Records all **behaviors** observed in each 2-minute time frame for the full class time
- What will the final data look like?

# Sample COPUS data

**Instructor is doing:**



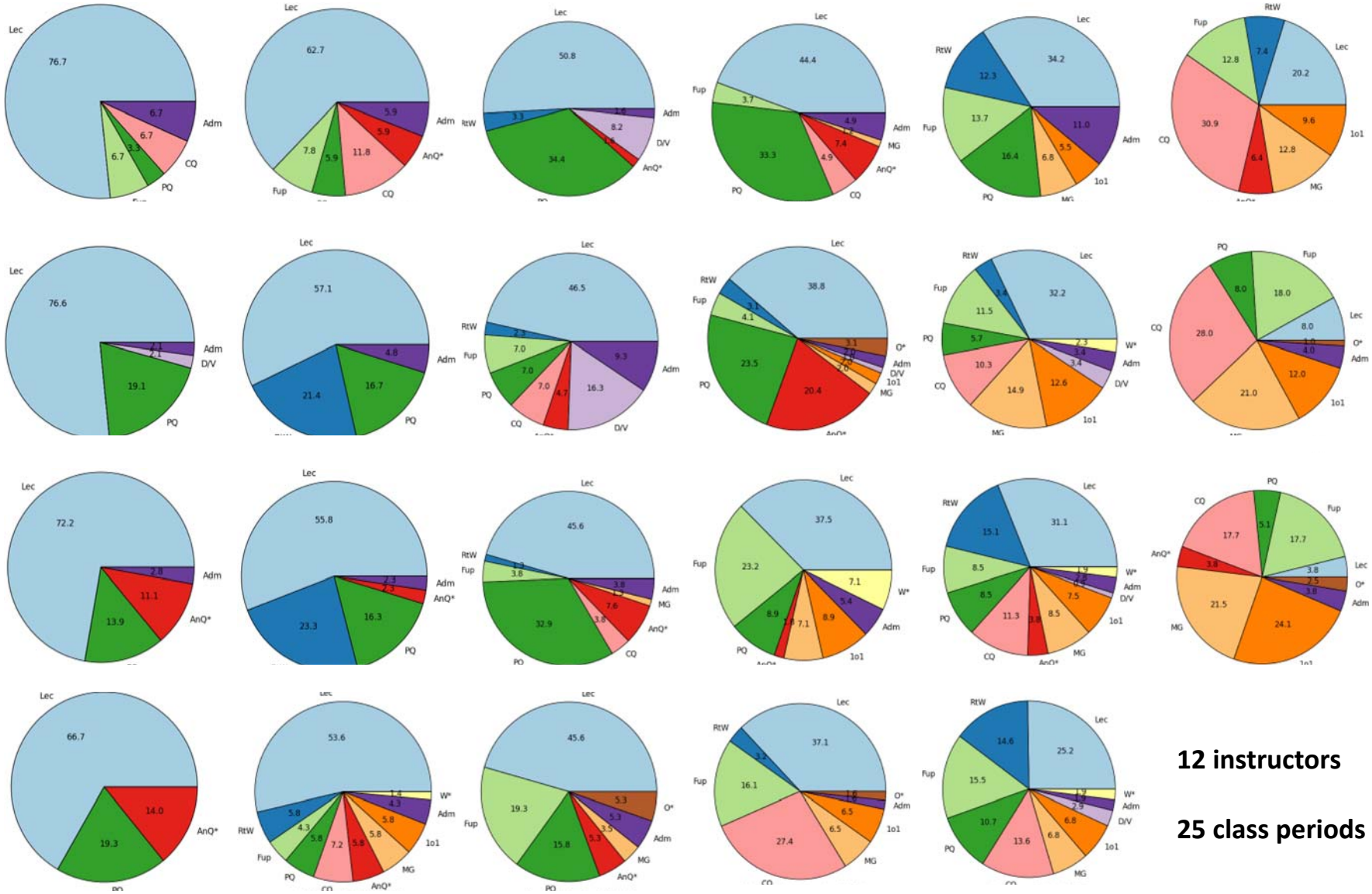

**Students are doing:**




- Lec-Lecture
- Adm-Administration
- AnQ-Answer question
- CQ-Ask clicker question
- PQ-Posing question
- Fup-Follow up

- L-Listening
- SQ-Ask question
- AnQ-Answer question
- CG-Discuss clicker question
- Ind-Individual thinking

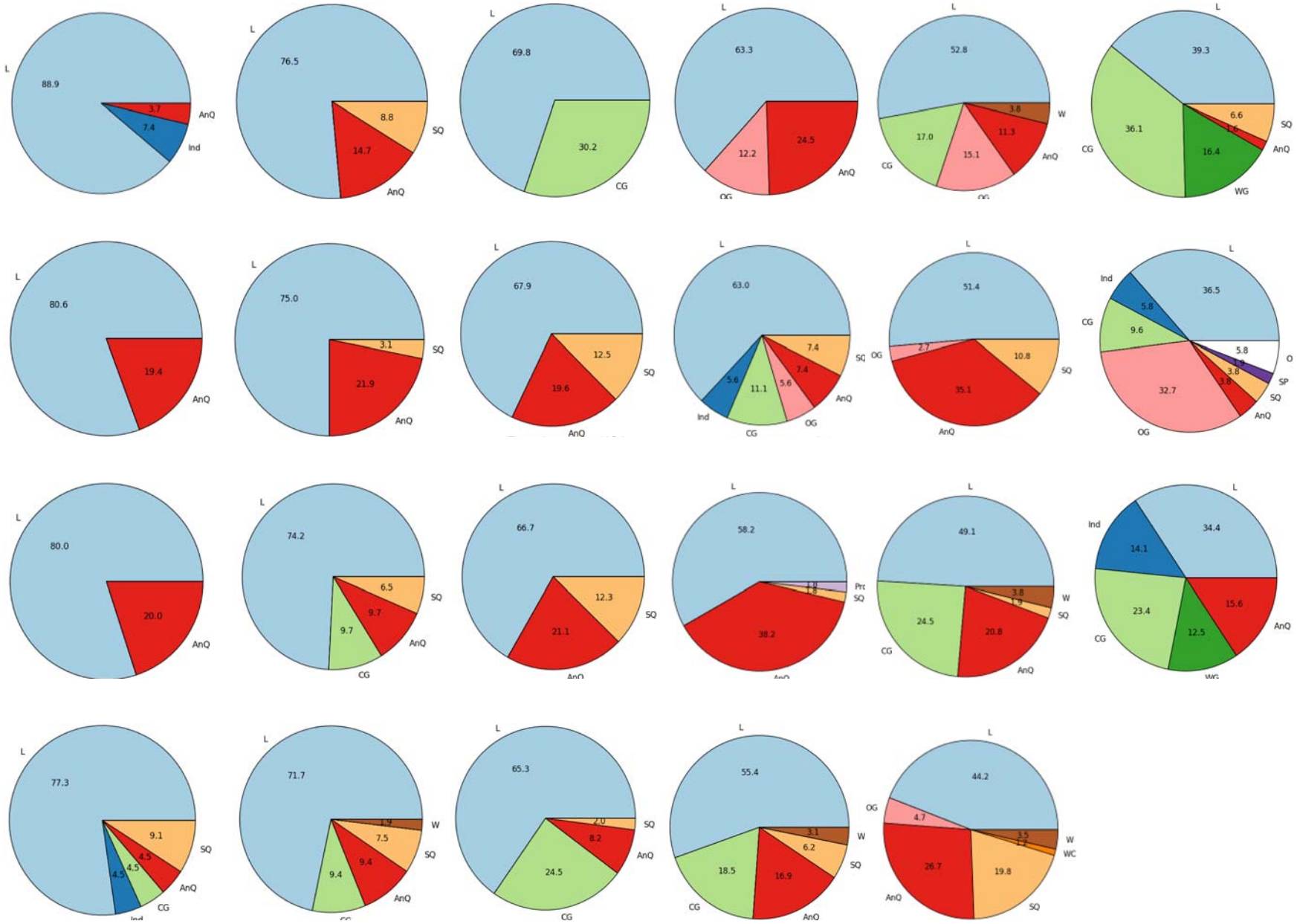
# FLC Members Use a Variety of Instructional Strategies




**12 instructors**

**25 class periods**

# Students in FLC Classrooms Show a Variety of Behaviors



# RTOP
# (Reformed Teaching Observation Protocol)

**V. CLASSROOM CULTURE**

| | Communicative Interactions | Never Occurred | | | | Very Descriptive |
|---|---|---|---|---|---|---|
| 16) | Students were involved in the communication of their ideas to others using a variety of means and media. | 0 | 1 | 2 | 3 | 4 |
| 17) | The teacher's questions triggered divergent modes of thinking. | 0 | 1 | 2 | 3 | 4 |
| 18) | There was a high proportion of student talk and a significant amount of it occurred between and among students. | 0 | 1 | 2 | 3 | 4 |
| 19) | Student questions and comments often determined the focus and direction of classroom discourse. | 0 | 1 | 2 | 3 | 4 |
| 20) | There was a climate of respect for what others had to say. | 0 | 1 | 2 | 3 | 4 |
| | **Student/Teacher Relationships** | | | | | |
| 21) | Active participation of students was encouraged and valued. | 0 | 1 | 2 | 3 | 4 |
| 22) | Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence. | 0 | 1 | 2 | 3 | 4 |
| 23) | In general the teacher was patient with students. | 0 | 1 | 2 | 3 | 4 |
| 24) | The teacher acted as a resource person, working to support and enhance student investigations. | 0 | 1 | 2 | 3 | 4 |
| 25) | The metaphor "teacher as listener" was very characteristic of this classroom. | 0 | 1 | 2 | 3 | 4 |

# RTOP
# (Reformed Teaching Observation Protocol)

- What is being observed?
  - Lesson, student behavior & activities, classroom climate, teachers behavior, student/teacher relationship
- What will the researcher record?
  - A **score or rating** for 25 different items from 0 (never occurred) to 4 (very descriptive)
- What will final data look like?
  - Outcome is a score out of 100

# RTOP scores

*Table 3. Categorization of RTOP scores.*

| RTOP category | Typical RTOP score | Type of teaching |
|---|---|---|
| I | 0–30 | Straight lecture |
| II | 31–45 | Lecture with some demonstration and minor student participation |
| III | 46–60 | Significant student engagement with some minds-on as well as hands-on involvement |
| IV | 61–75 | Active student participation in the critique as well as the carrying out of experiments |
| V | 76–100 | Active student involvement in open-ended inquiry, resulting in alternative hypotheses, several explanations, and critical reflection. |

*Source:* Adapted from Sawada 2003.
RTOP, Reformed Teaching Observation Protocol

# PORTAAL (Practical Observation Rubric To Assess Active Learning)

Students have opportunities to practice during class.

Students practice logic development.

Students are held accountable for engaging in practice and logic development in class.

Instructor reduces fear about participating in practice, logic development, and discussions.

# PORTAAL (Practical Observation …..

- What is being observed?
  - Active learning “activities” in classroom and how they are implemented (4 “dimensions” with a total of 21 “elements”)
- What will the researcher record?
  - **Whether** things occur, **timing** that things occur, **how many** times things occur
- What will the final data look like?
  - Average frequency or duration for each of 21 elements

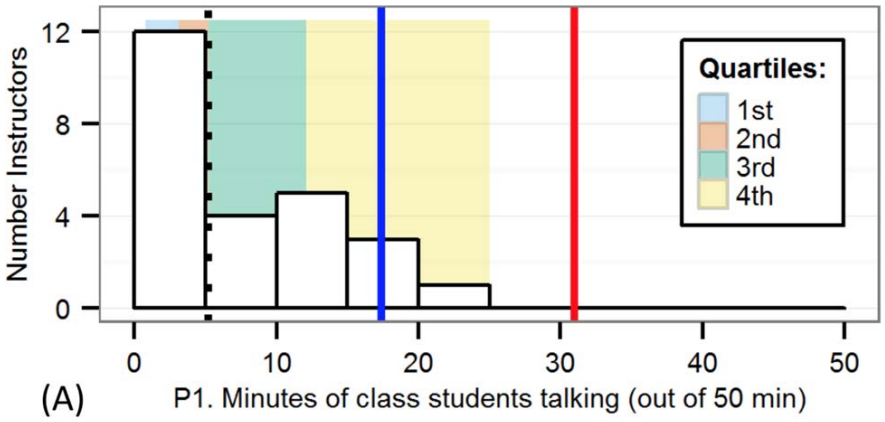
# PORTAAL

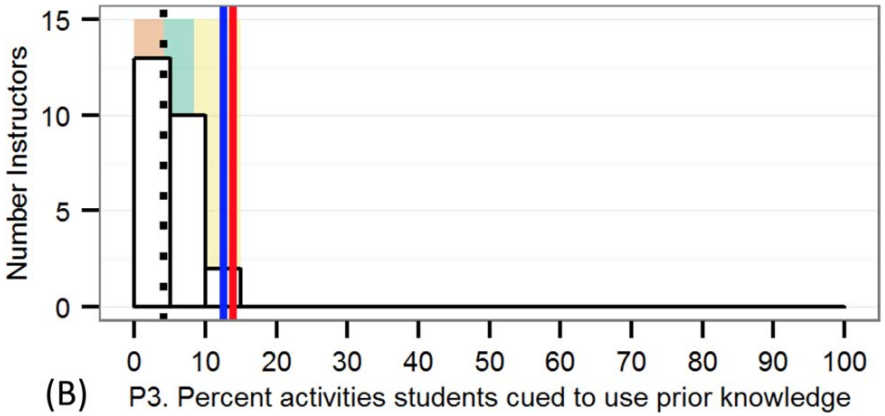
**Table 1.** Elements in the dimension of practice and the evidence supporting them[a]

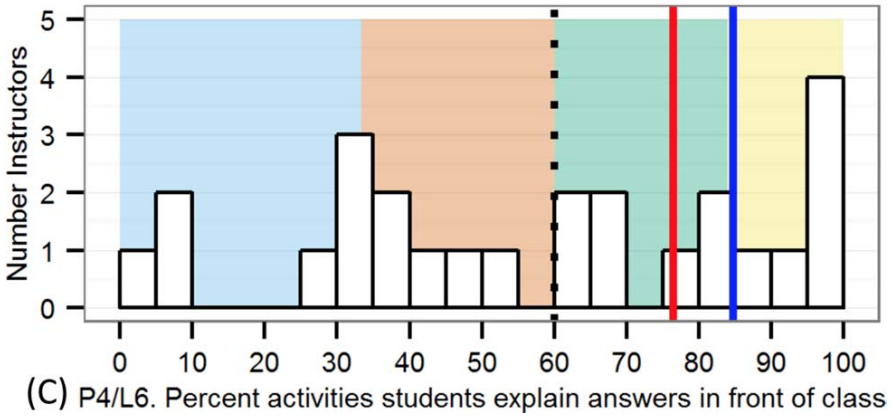
| | | How element is observed in the classroom | Increases achievement | Improves conversations | Improves other measures | Citations |
|---|---|---|---|---|---|---|
| Dimension 1: Practice | | | | | | |
| Elements | P1. Frequent practice | Minutes any student has the possibility of talking through content in class | √ | | | Wood *et al.*, 1994; Willoughby *et al.*, 2000; Preszler *et al.*, 2007; Thomas and McDaniel, 2007; Dunlosky *et al.*, 2013 (review) |
| | P2. Alignment of practice and assessment | In-class practice questions at same cognitive skills level as course assessments (requires access to exams) | √ | | | McDaniel *et al.*, 1978; Morris *et al.*, 1977; Thomas and McDaniel, 2007; Ericsson *et al.*, 1993; Jensen *et al.*, 2014; Wormald *et al.*, 2009; Morgan *et al.*, 2007 |
| | P3. Distributed practice | Percent of activities in which instructor reminds students to use prior knowledge | √ | | | deWinstanley *et al.*, 2002; Dunlosky *et al.*, 2013 |
| | P4. Immediate feedback | Percent of activities in which instructor hears student logic and has an opportunity to respond | √ | | | Renkl, 2002; Epstein *et al.*, 2002; Ericsson *et al.*, 1993; Trowbridge and Carson, 1932 |

[a]Measures are positively correlated with dimension unless otherwise stated. All these measures were on adult learners, although they were not all in large-lecture contexts.

# Sample PORTAAL data




Dimension 1: Practice—variation in implementation of elements. Histograms demonstrating the variation in instructor classroom practice for each element of the dimension of practice.
The black dotted line is the median for the 25 instructors; the red line is the practice of the instructor who reduced student failure rate by 65%; and the blue line is the instructor who reduced failure rate by 41%. Each quartile represents where the observations from 25% of the instructors fall.

# Choosing an observation protocol

- Consider two scenarios
  - Working individually, make a decision about which protocol you will use and write an explanation for this choice.
  - Working in pairs, share your decisions and explanations and come to a consensus.
  - Be prepared to share your team's reasoning.

# Research scenario 1

You are part of a large research group that is a collaboration among researchers at 10 universities around the US. You are providing long-term (3-5 years) teaching professional development for biology faculty at each institution. One way you are evaluating this teaching professional development is by conducting classroom observations of each faculty (n = 46) at each institution. At most institutions, undergraduate researchers will do the observations, but they will all be trained together through virtual meetings. As part of the professional development, you tell faculty that you are happy to share the results of their classroom observations with them (just their own data). Ultimately you would like to make some quantitative comparisons among teachers.

# Research scenario 2

You have developed a student-centered curriculum for introductory chemistry courses that used reformed teaching practices, including active learning. You have created and refined this curriculum in your own class. Currently you are testing its effectiveness at your own institution. Five other faculty have agreed to use this curriculum in their classes. You will assess effectiveness through classroom observations and pre/post-testing of student understanding. A PhD student is leading this research. You and the student will conduct all of the observations. Ultimately you would like to make some quantitative comparisons among teachers.

# Classroom Observation Protocol for Undergraduate STEM (COPUS)

- Tracks instructor AND student behavior
- Records behavior, does not judge quality of instruction
- Observers can be trained to reliably observe with less than a day of training

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# Learn the codes

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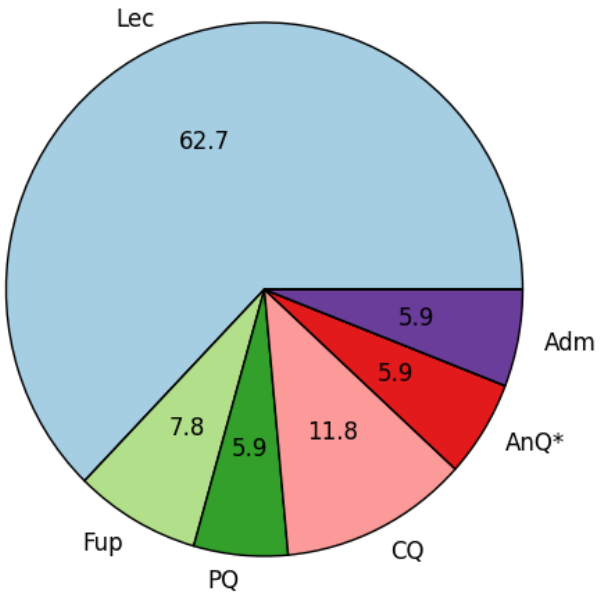


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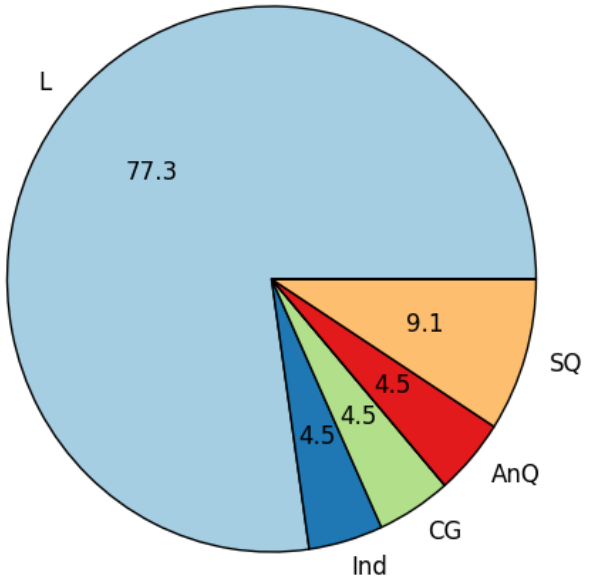


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# Video 1

- Code 28:00 – 30:00

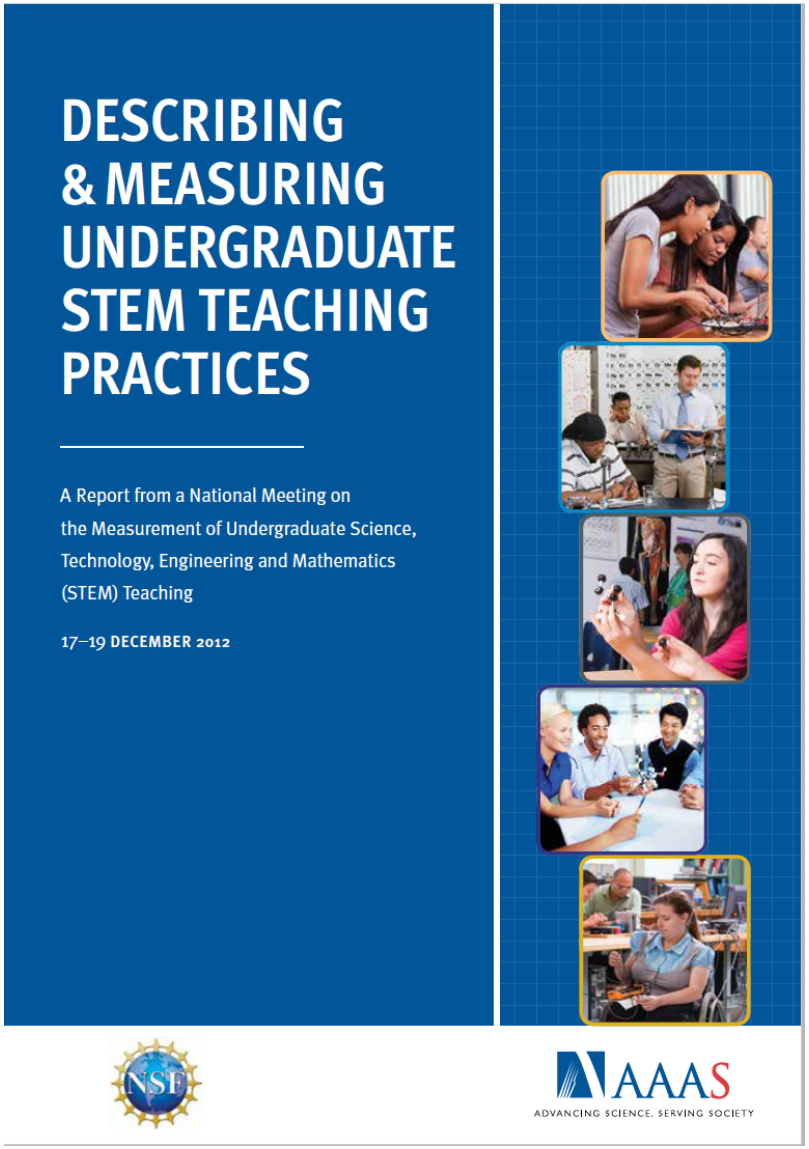
- Discuss

# Video 2

- Code first 2 minutes in pairs
- Discuss
- Code remaining 6 minutes
- Discuss

# Establishing reliability as a team

# Other observation protocols




- COPUS
- RTOP – reformed teaching
- TDOP – similarities to COPUS
- EQUIP – quality of inquiry practices
- PORTAAL – best practices for active learning in large classes

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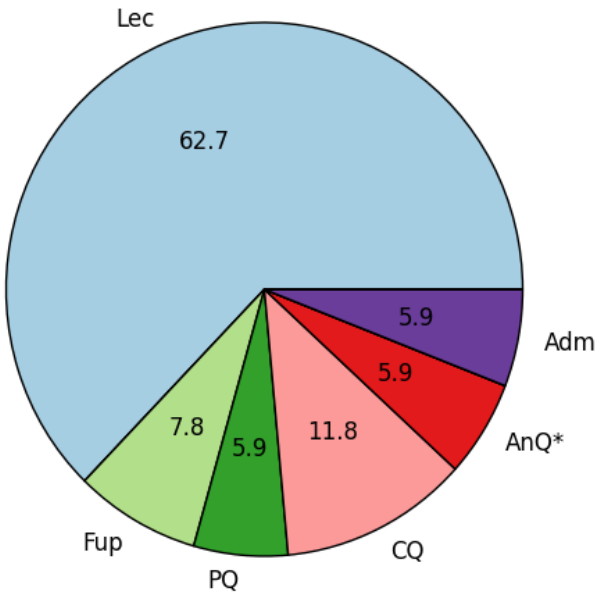


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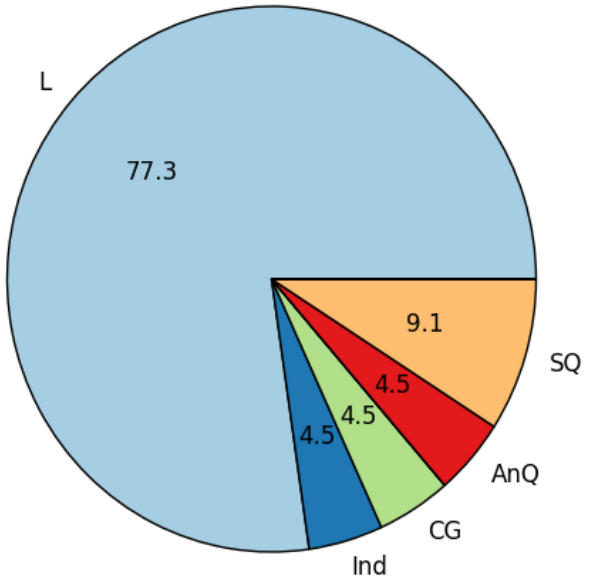


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