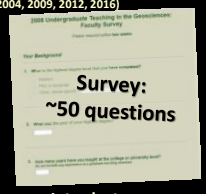
Measuring Active Learning in the Geosciences:

- Instructor Surveys
- Classroom Observations

Geoscience Teaching Practices Survey

4 national surveys
(2004, 2009, 2012, 2016)



Survey Populations: 5700-7813 geoscience instructors

Response rate: 32-49%

- **Introductory courses**
- **Majors courses**

On the Cutting Edge Professional Development for Geoscience Faculty — 15 Years

Geoscience Teaching Practices Survey

Q15.1 In the "lecture portion" of your course, please estimate the percentage of class time spent on student activities, questions, and discussion. Your response must be between 0 and 100.

Q16.1 In the "lecture portion" of your course, please indicate how frequently you used the following teaching strategies:
(1) Never (2) Once or twice (3) Several times (4) Weekly (5) Nearly every class
Q16A.1: Traditional lecture
Q16B.1: Lecture with demonstration
Q16C.1: Lecture in which questions posed by instructor are answered by individual students (e.g. professor calls on individual students)
Q16D.1: Lecture in which questions posed by instructor are answered simultaneously by the entire class (e.g. students vote using cards or electronic response systems)
Q16E.1: Small group discussion or think-pair-share
Q16F.1: Whole-class discussions
Q16G.1: In-class exercises

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Q15.1 In the "lecture portion" of your course, please estimate the percentage of class time spent on student activities, questions, and discussion. Your response must be between 0 and 100. **>20%**

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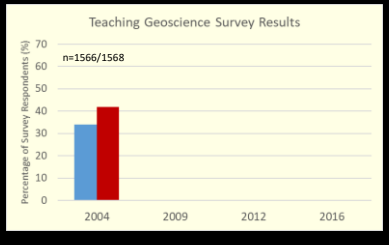
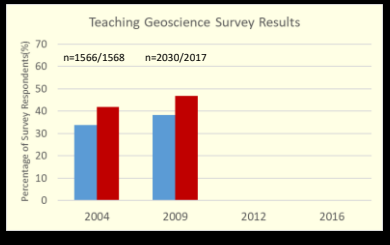


Instructors who spend >20% of class time on student activities, questions, and discussions

Instructors who report using discussions, think-pair-share, in-class exercises weekly or in nearly every class

Manduca et al., 2017; K. Viskupic, pers. comm, 2018

Geoscience Teaching Practices Survey



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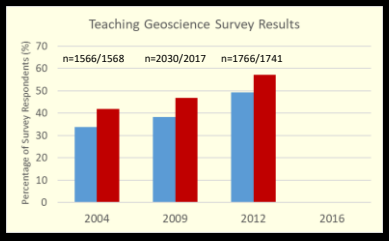

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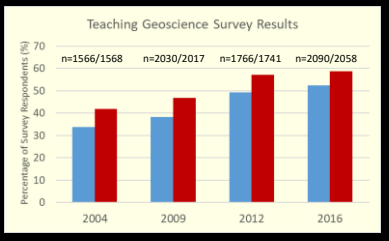

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Measuring Active Learning in the Geosciences

Reformed Teaching Observation Protocol

Describes teaching process on five subscales

- Lesson design by instructor
- Propositional knowledge of instructor
- Procedural knowledge (what students do)
- Student-Student Interactions
- Student-Teacher Interactions

- Five statements per subscale

Observer perspective

18) There was a high proportion of student talk and a significant amount of it occurred between and among students (quantity of interactions)				
No student-student talk 0	Students talk to each other at least once (about lesson content) 1	Student-student talk occurs at least 10% of the time during the course of the class 2	Student-student talk occurs more than 25% of the time during the course of the class 3	In any given moment during the lesson, students are more likely to be talking to each other than the teacher (>50% student to student) 4

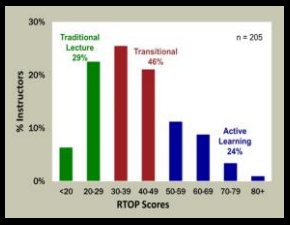
Sawada et al., 2002; Macisaac and Falconer, 2002

Measuring Active Learning in the Geosciences

- Maximum score = 100
- RTOP - classrooms featuring more active learning practices have higher scores

Classroom Observation Project
205 instructors/classes
Average RTOP score = 39.7

Budd et al. (2013)
26 instructors, 66 classes
Average RTOP score = 41.5



Teasdale et al., 2017

Active Learning Features in the Geosciences

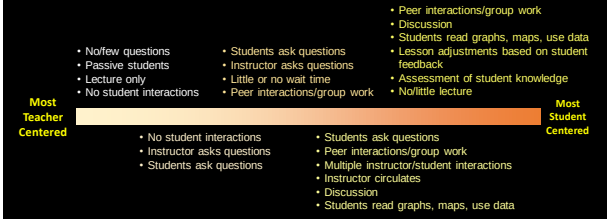


Figure based on Table 4, Teasdale et al., 2017

Predict how many of these statements were TRUE.

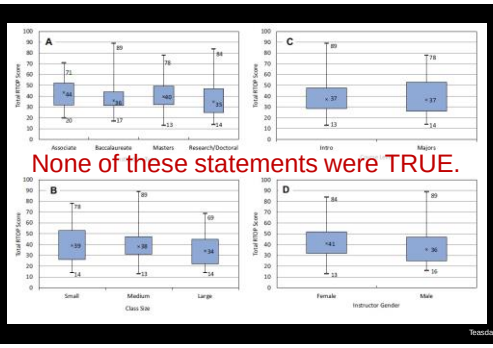
A. RTOP scores were statistically different for different types of academic institutions (e.g., two-year colleges, research institutions).

B. RTOP scores were statistically different for classes of different sizes.

C. RTOP scores were statistically different for introductory courses and majors courses.

D. RTOP scores were statistically different by gender of the instructor.

Teasdale et al., 2017

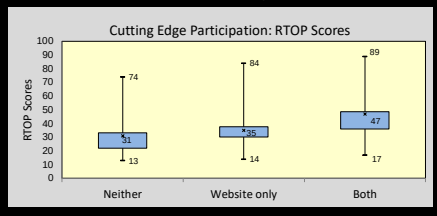


None of these statements were TRUE.

Teasdale et al., 2017

Professional Development vs. RTOP scores

Instructors who participated in Cutting Edge workshops and used the web resources had higher RTOP scores



Manduca et al., 2017,

Summary: Instructional Reform in the Geosciences

- Instructors reported progressively greater use of research-based instructional strategies in geoscience courses over the last two decades
- Self-report survey data are supported by observations across more than 200 classrooms
- Instructional changes are more likely when the instructor has participated in professional development and made use of related online resources
- No difference in the character of instruction on the basis of type of institution, size of class, class content or instructor gender
- Change more likely driven by robust PD program that reaches a relatively large proportion of geoscience faculty than more limited footprint of Geoscience Education Research