



NAGT



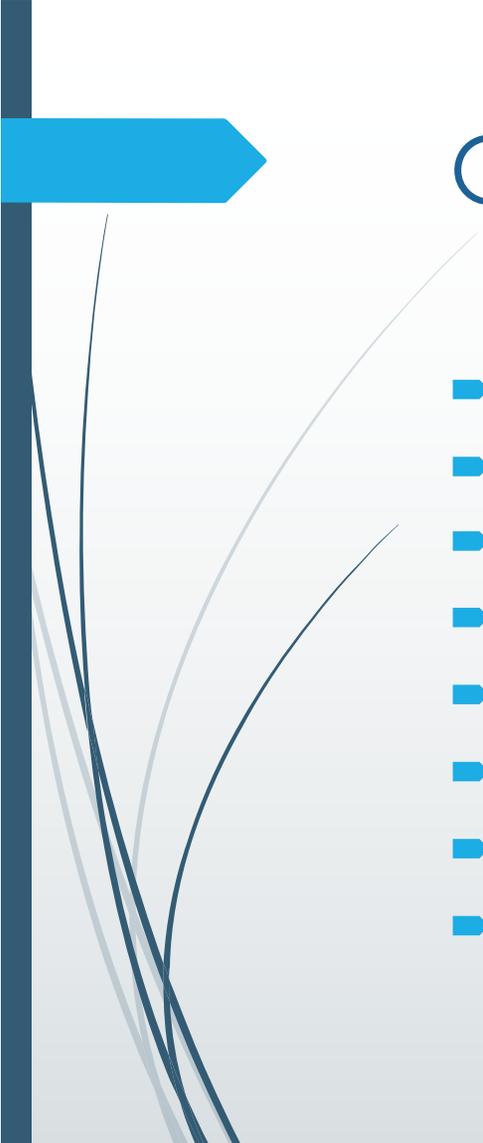
Heads & Chairs: Future of Undergraduate Geoscience Education, Day 3

Earth Educators Rendezvous, 17 July 2019

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THE UNIVERSITY OF BRITISH COLUMBIA



Overview

- ▶ 8:30 Intro to Session. Reflection on Day 2
- ▶ 8:45 Research-based pedagogies
- ▶ 9:05 Active learning jigsaw
- ▶ 9:45 Mapping pedagogies to program matrix
- ▶ 10:05 Break
- ▶ 10:20 Discussion of pedagogy mapping
- ▶ 10:50 Curricular design action plan: priorities
- ▶ 11:30 Adjourn



Reflection on Day 2

- ▶ What stood out for you from Day 2?
- ▶ Why was that relevant/important?
- ▶ What are key next steps?



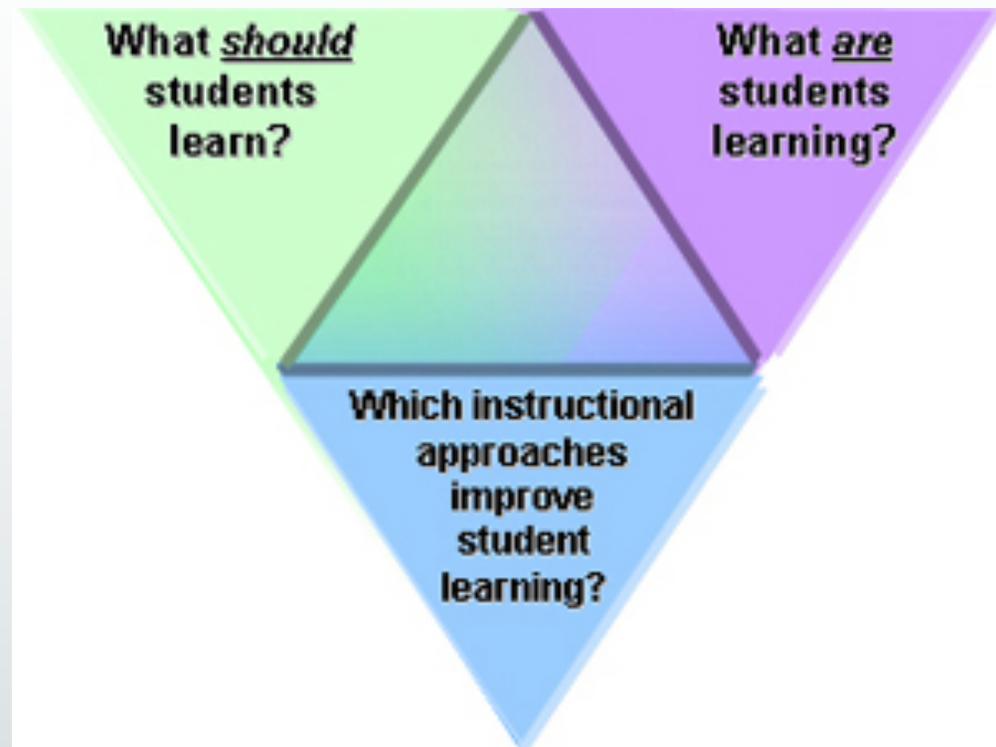
What does "active learning" mean to you?

- ▶ Go to www.menti.com and type in the code
- ▶ If you don't have an electronic device, please write down your thoughts on paper.



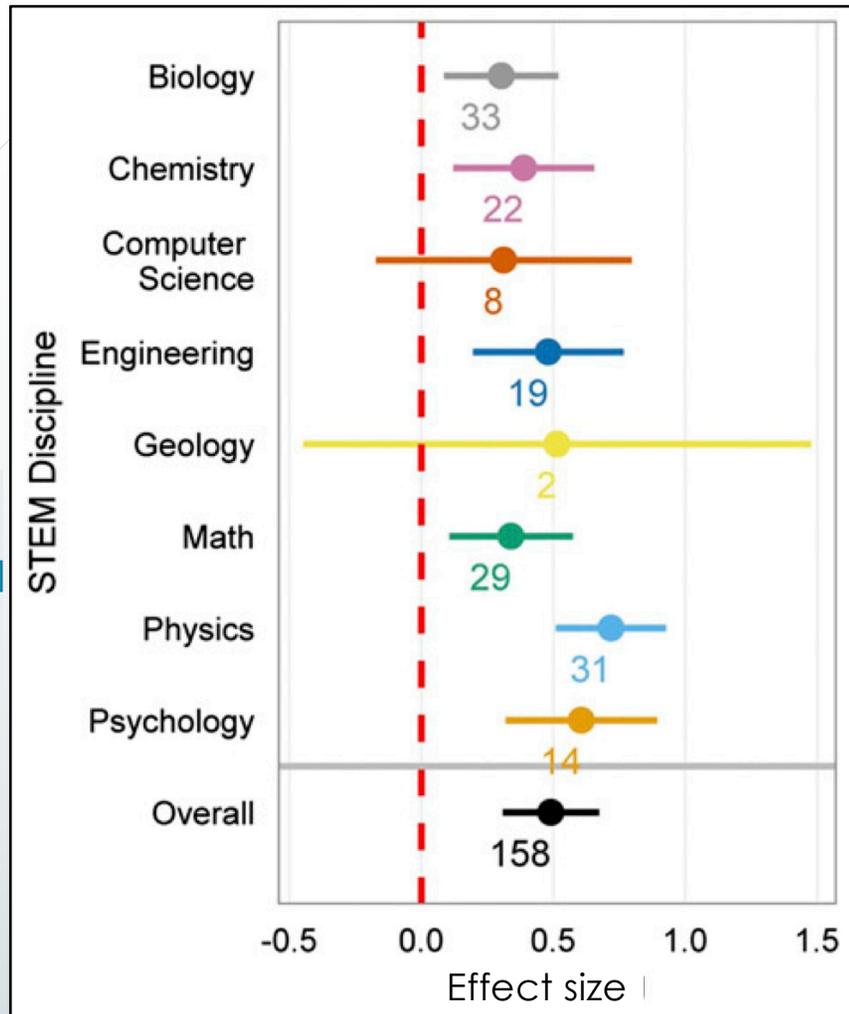
Instructors' tasks, as the expert:

- Set appropriate challenges
- Provide feedback and guidance (requires expertise)
- Engage students regarding why it's worth learning



Comparing outcomes: Increased learning

Lecturing =
increased
performance



► Meta-analysis

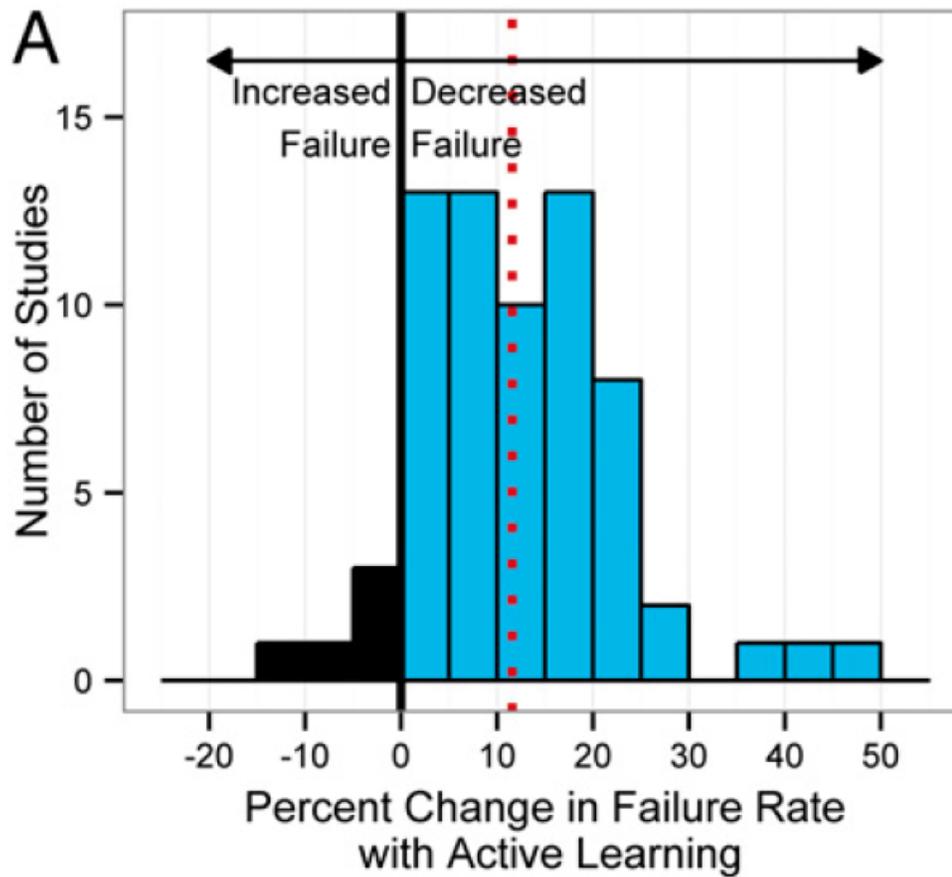
► 225 studies

► Measures

► Concept inventories
& exams

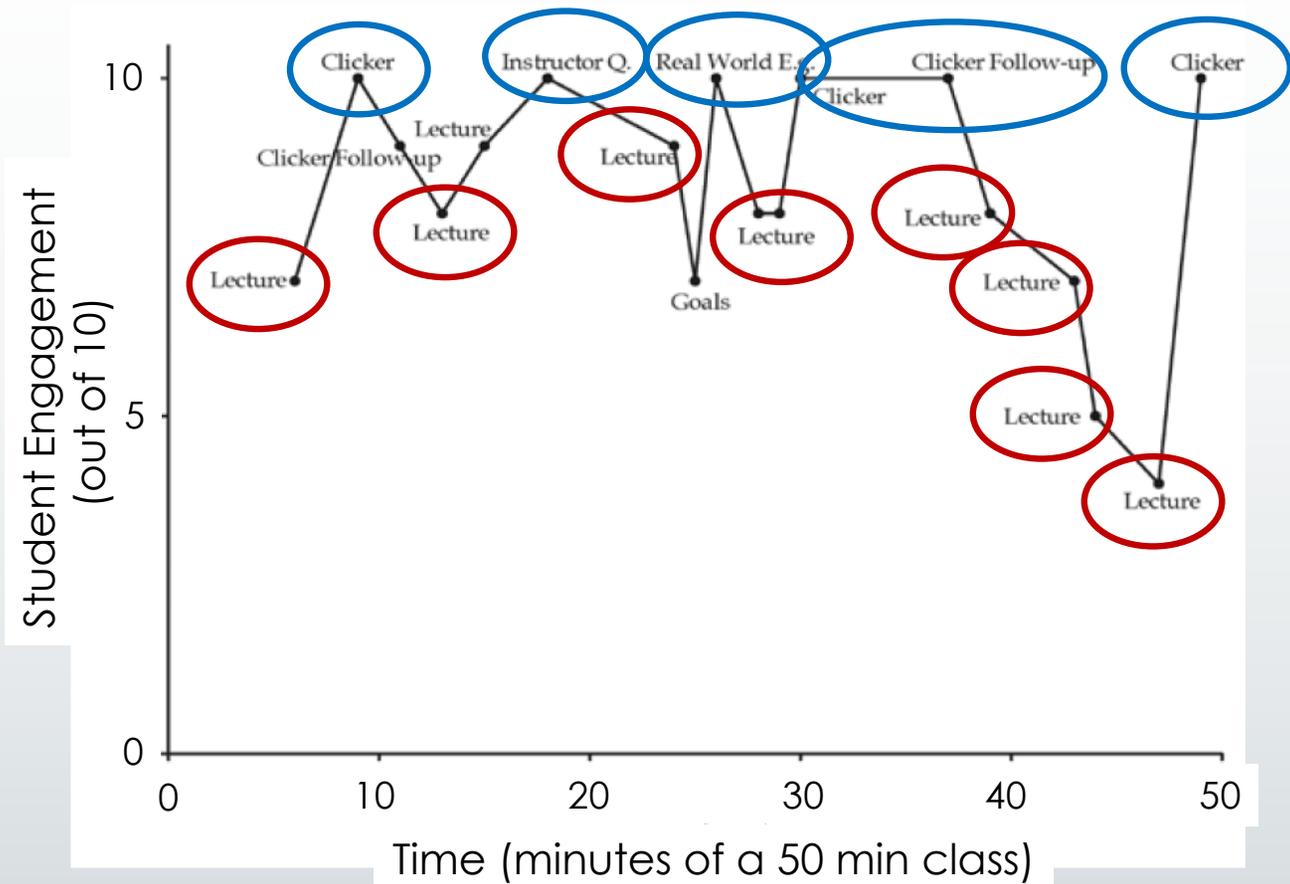
Active learning =
increased
performance

Comparing outcomes: Decreased failures



- ▶ Comparisons with the same course, under active learning vs lecturing
- ▶ More students pass with active learning

Increased engagement



Comparing outcomes: decrease achievement gaps for marginalized groups

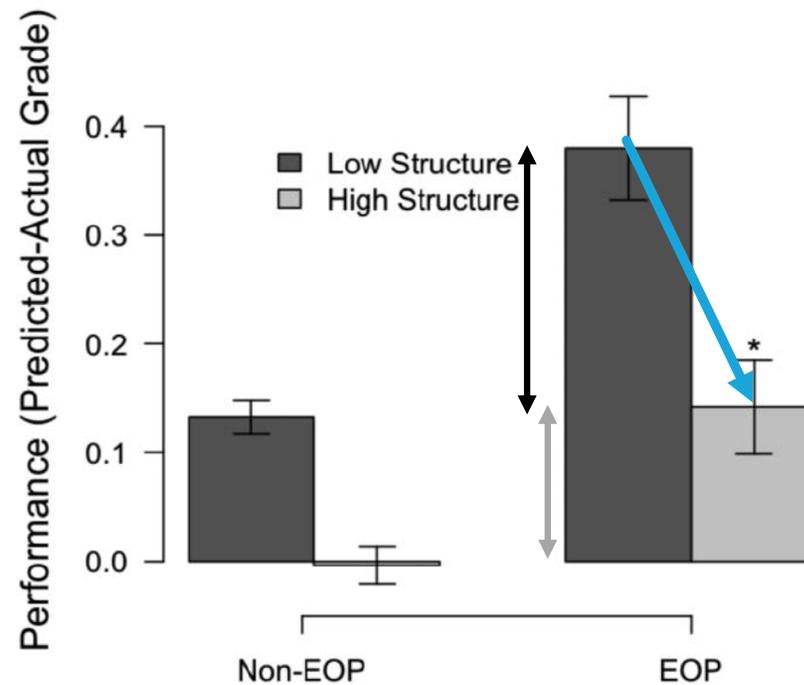


Fig. 2. Highly structured course designs benefit all students, but especially disadvantaged students.

“High structure” = active learning pedagogies

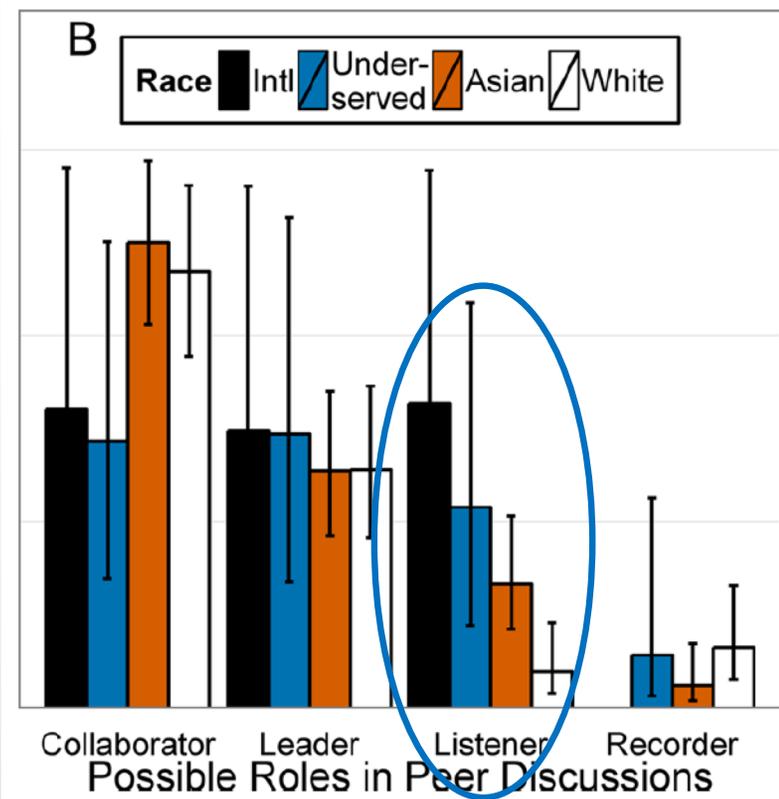
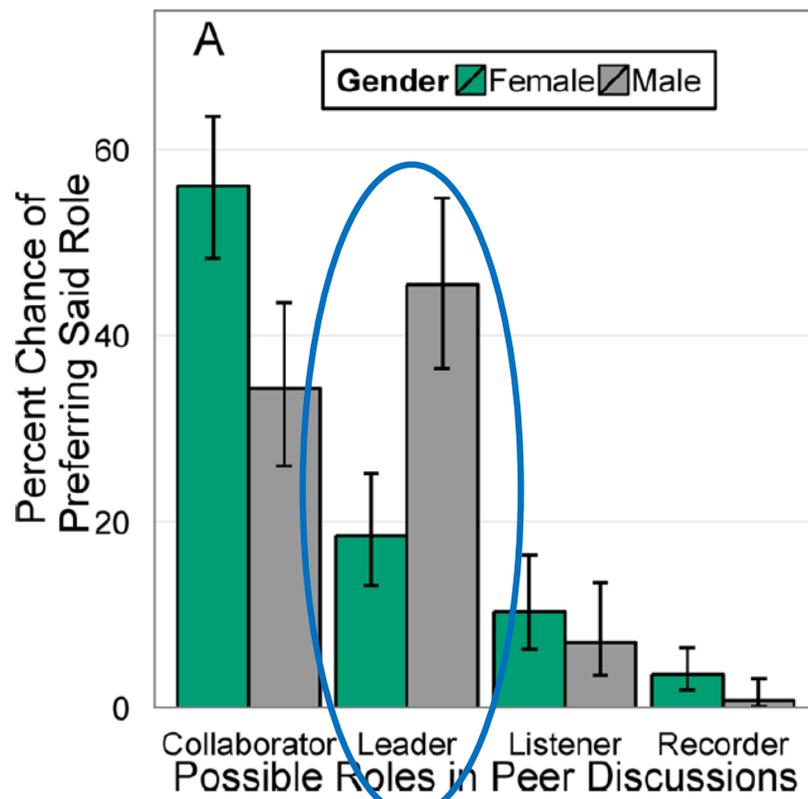
“Low structure” = lecture intensive

EOP = Educationally or economically disadvantaged

Haak et al., 2011

Large biology course at University of Washington

Group work: structure matters for inclusion





Strategies to promote equity in active learning

- ▶ Use peer discussions (small groups) instead of, or in addition to, whole class discussions
- ▶ Provide group structure:
 - ▶ Consistency: students can develop rapport
 - ▶ Assign and rotate/randomize roles
- ▶ Choose activities that promote contributions from all (e.g. jigsaws)
- ▶ Have students write their ideas before discussion starts



Some reasons to move toward active learning

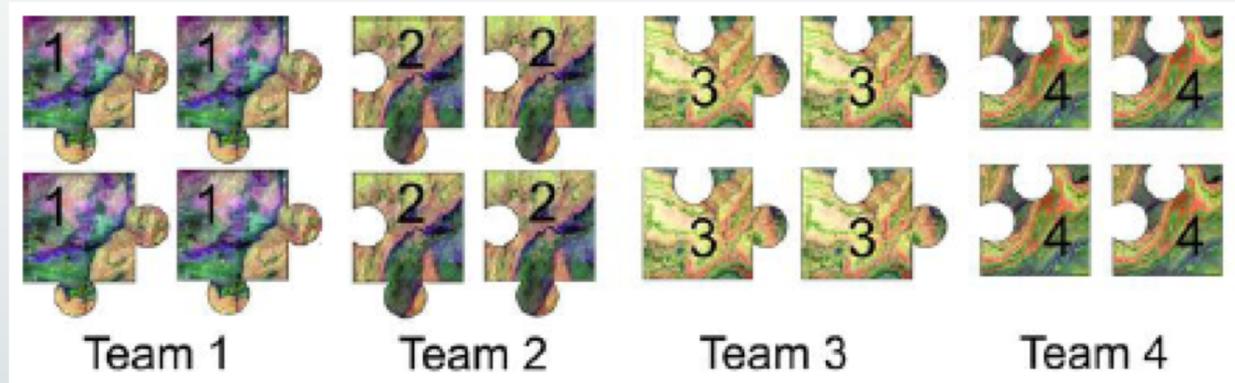
- ▶ To increase learning
- ▶ To decrease failure rates
- ▶ To increase engagement
- ▶ To make my classroom more equitable
- ▶ To give more timely feedback to my students
- ▶ To give students more expert-like practice
- ▶ To increase my own pedagogical content knowledge
- ▶ To progress in my career
- ▶ To get better teaching evaluations
- ▶ To increase my own interest in my job
- ▶ To have more fun teaching

Active Learning Jigsaw Part 1

Find your first group

In your first group: *Discussion Leader: person who drank most coffee today*

- For your active learning technique
 - Identify advantages & opportunities for using it
 - Identify disadvantages, challenges, barriers to using it



Puzzle graphics by Barbara Tewksbury, with background ASTER image from NASA/GSFC/MET/ERSDAC/JAROS, and U.S./Japan ASTER Science Team

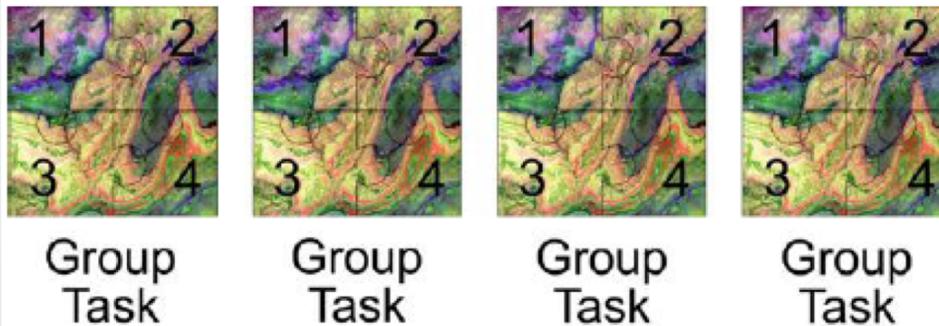
Active Learning Jigsaw Part 2

Find your second group

In your second group:

Discussion Leader: person who lives farthest away

- Pick one skill/concept/competency
- Draft ideas for an active learning experience for that skill/concept/competency



Puzzle graphics by Barbara Tewksbury, with background ASTER image from NASA/GSFC/METI/ERSDAC/JAROS, and U.S./Japan ASTER Science Team



Mapping Pedagogies to Your Program Matrix

- ▶ In teams (or individually)
 - ▶ Map a few active pedagogies/student experiences to align with key skill/concept/competency goals in your matrix.
 - ▶ Identify where these pedagogies could be effectively implemented.
 - ▶ Challenges?
 - ▶ Prepare to report out:
 - ▶ E.g. a challenge you encountered in thinking about implementation or evaluation of pedagogical change
 - ▶ A strategy, or solution to a challenge



BREAK: until 10:20

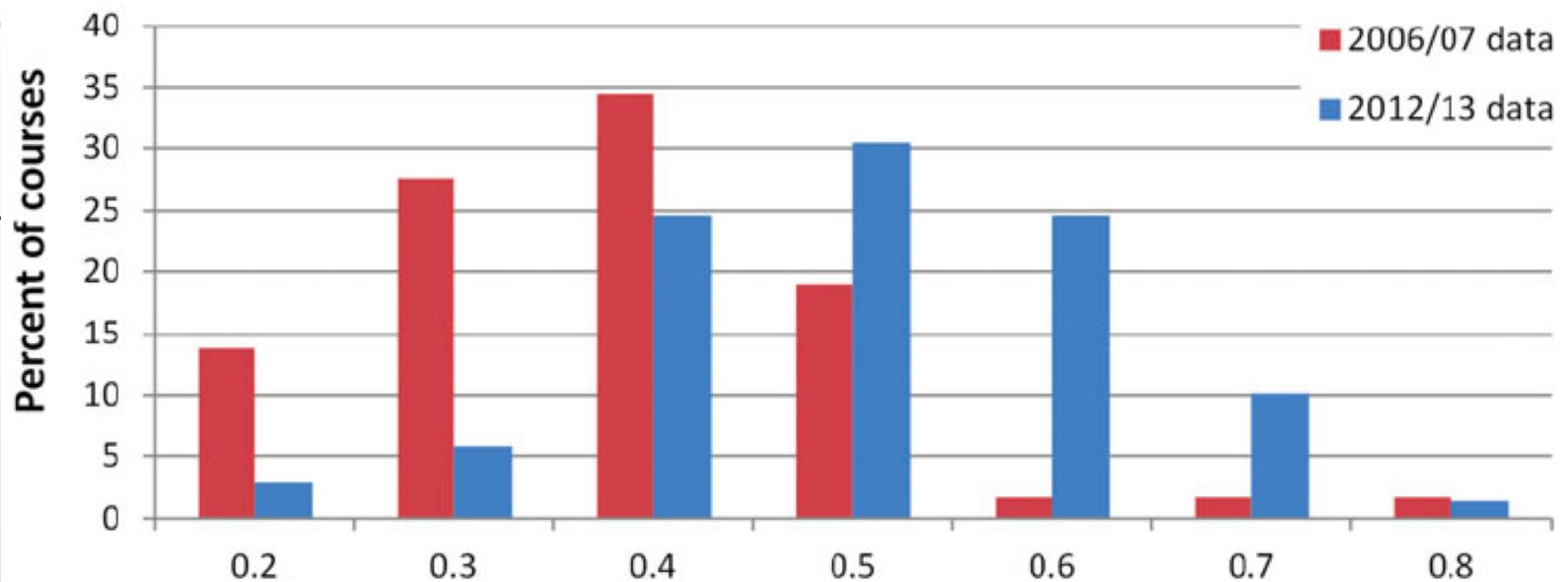


Strategies and Challenges in Pedagogical Change

- ▶ Report out (~1 idea per group)
 - ▶ Strategy/Challenge in implementation?
 - ▶ Strategy/Challenge in evaluation?

Change is possible: Teaching Practices Inventory data

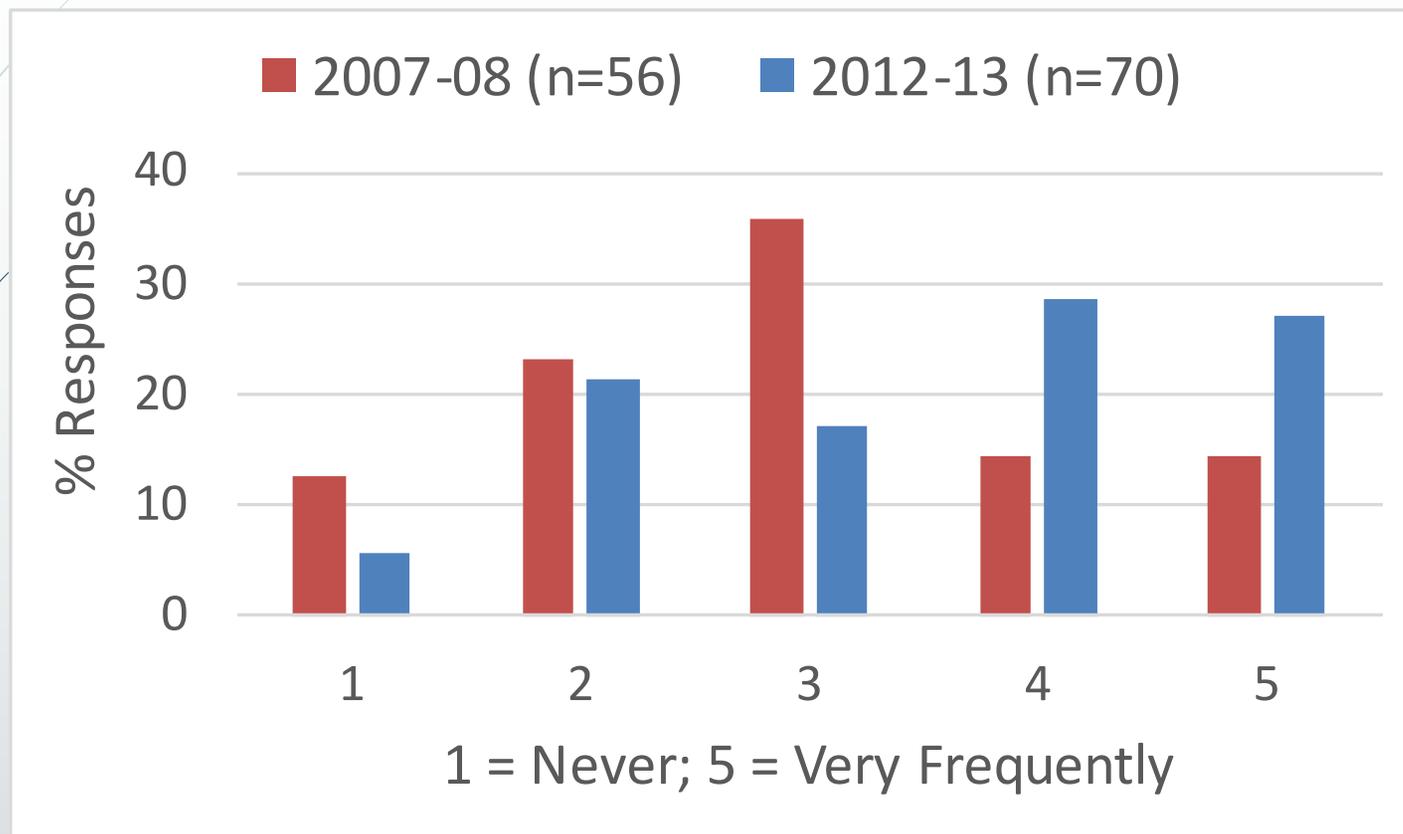
One department's change toward active learning



Extent of use of research-based teaching practices. MORE →

Change is possible:

“Discussed how to teach, with a colleague”



Strategies: Paired Teaching (Teaching Start-Up)

- ▶ Well-structured course
 - ▶ Goals, assessments, activities aligned
 - ▶ Active learning pedagogies
- ▶ New + Experienced Instructor
- ▶ Immersive experience
- ▶ Fully collaborative, not split



<https://blog.oxforddictionaries.com/2016/02/12/unusual-etymologies/>



<http://www.collegehumor.com/post/6961649/the-10-most-adorable-unlikely-animal-pairs>



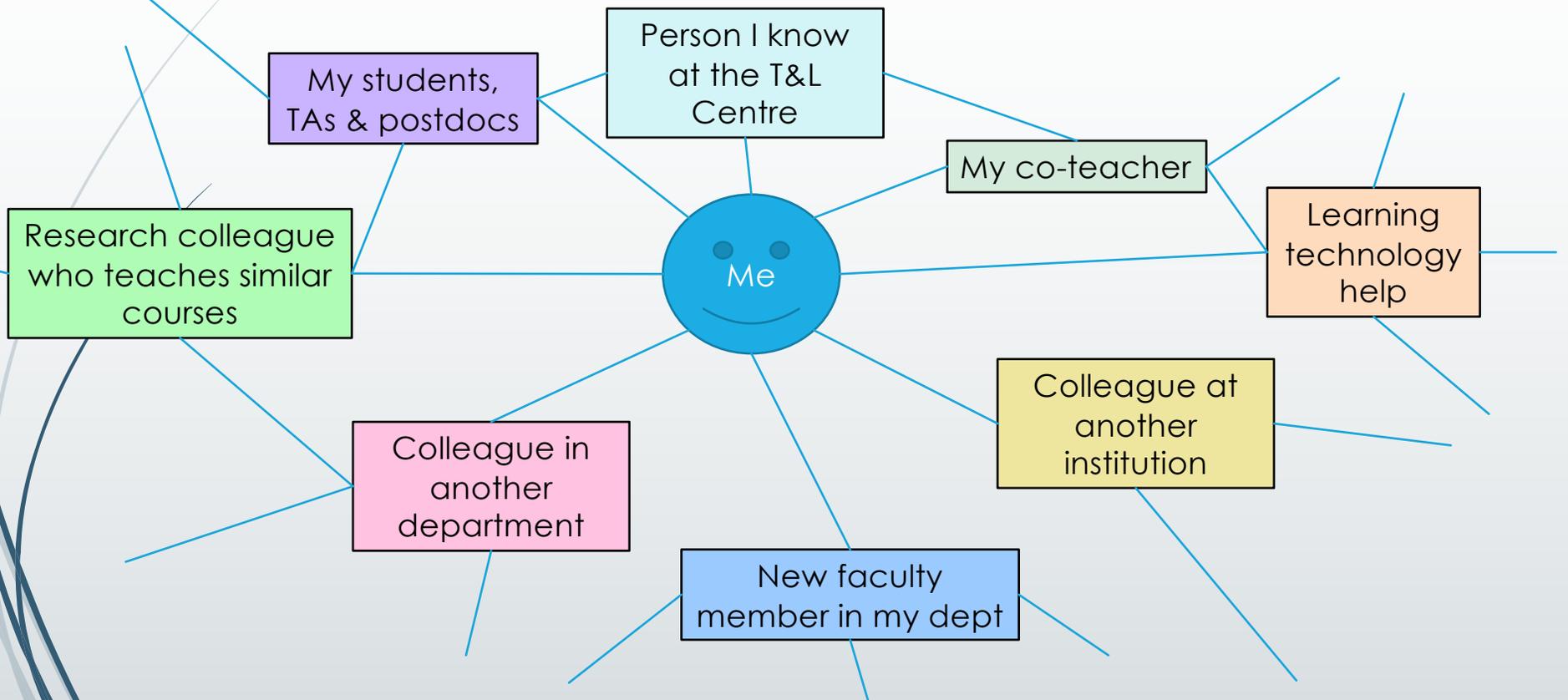
<https://community.dynamics.com/crm/b/crmbusiness/archive/2014/07/31/business-rules-work-in-pairs-because-the-condition-is-and-not-if>



More Strategies:

- ▶ **Focused Faculty Retreat**
- ▶ **Early Career Workshops**
 - ▶ <https://serc.carleton.edu/NAGTWorkshops/earlycareer2019/index.html>
 - ▶ July 28-Aug 1, 2019. Univ of Maryland
- ▶ **NAGT Traveling Workshop Series**
 - ▶ <https://nagt.org/nagt/profdev/twp/index.html>

Who's in your current network? Who could be in your network?

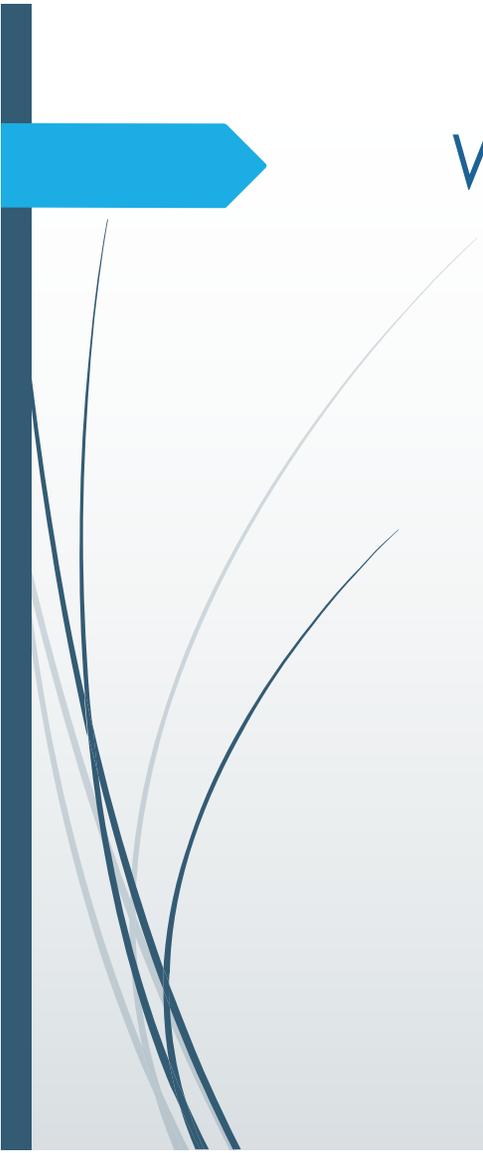




Continue Curricular Design Action Plan

- ▶ Write down
 - ▶ TOP priorities
 - ▶ FIRST ACTION for each priority

- ▶ Submit your action plan to:
 - ▶ https://serc.carleton.edu/earth_rendezvous/2019/program/morning_workshops/w5/workspace/index.html

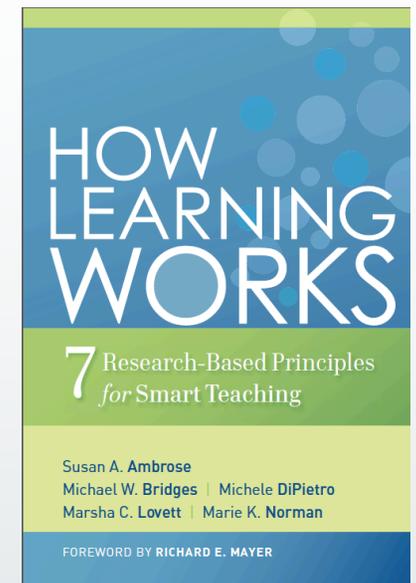


Workshop Feedback

Thank You!

Seven Research-based Principles

1. Prior knowledge can help or hinder learning
2. Organization of knowledge influences learning and application
3. Motivation determines, directs, and sustains learning
4. Mastery requires acquiring, integrating, and applying component skills
5. Goal-directed practice coupled with targeted feedback enhances student learning
6. Students' level of development interacts with course social, emotional, & intellectual climate to impact learning
7. Students must learn to monitor and adjust their approaches to learning to be self-directing



Ambrose et al., 2010



Resources

- ▶ Many resources for instructors:
http://cwsei.ubc.ca/resources/instructor_guidance.htm
- ▶ Short videos showing some active learning techniques:
<http://blogs.ubc.ca/wpvc/>
- ▶ 2-pagers about teaching and learning topics, for instructors:
<https://www.eoas.ubc.ca/research/cwsei/eossei-times.html>
- ▶ Disciplinary repositories, e.g. Science Education Resource Center:
<http://serc.carleton.edu/index.html>
- ▶ “How Learning Works” by Ambrose, et al. (FULL BOOK PDF!):
http://teaching.temple.edu/sites/tlc/files/resource/pdf/What%20Factors%20Motivate%20Students%20to%20Learn_.pdf

