

The Benefits of Active Learning: Theory and Practice to Support Student Learning

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Biological Sciences



Workshop slides will be available at

<http://ls-cwsei.biology.ubc.ca>

Goals & Agenda

Time (mins)	Activity Description:
5	Intro
20	Describe how people learn, and what an active classroom looks like
20	Identify benefits of an active-learning classroom
10	What is the role of the instructor in an active classroom?
5	Closing

THINK-PAIR-SHARE:

How do people learn? Your list:

- **By being heard**
- **By being in a safe and valued environment**
- **By making real-life connections to the material**
- **By thinking critically, analyzing, applying**
- **By making mistakes**
- **By imitation**
- **Using multiple sense**
- **Inspiration**
- **Hearing stories**
- **Music and mnemonics**
- **Doing projects collaboratively**
- **Experimenting!**
- **By discussing, arguing, articulating**
- **By repetition**
- **By watching, taking notes – synthesizing, interpreting**
- **Hands on: themselves, and/or demonstrations**
- **By teaching!**

Students: on the novice → expert continuum

Experts

- Can identify patterns and relationships between scientific concepts
- Organize their knowledge differently than novices
- Make more connections – can retrieve and apply knowledge to novel problems
- Ability to monitor own thinking and learning
- Motivated to learn about the problem

Developing expertise takes
deliberate practice and feedback!
This is active learning.

What does an active class look like?

One thing
that
students are
doing

One thing
the
instructor(s)
is/are doing

Put these up on the wall!

Major themes that emerged:

Instructors:

Monitoring & guiding, facilitating/managing, asking questions, giving feedback, moving around, modeling and developing ideas

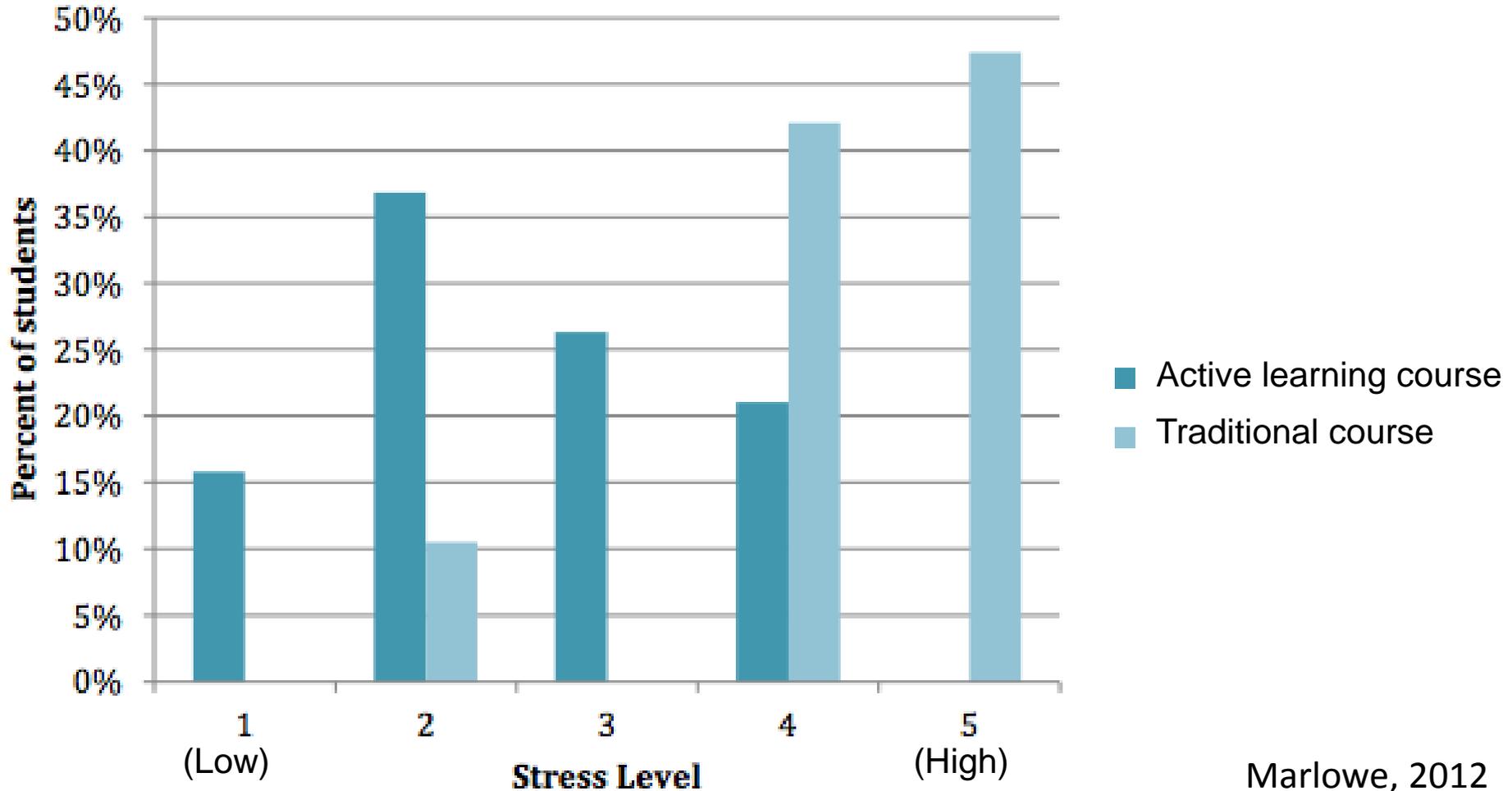
Students:

Asking/answering questions, engaged, in groups, talking, listening & reflecting, solving problems, having fun

What are some benefits
of active learning?

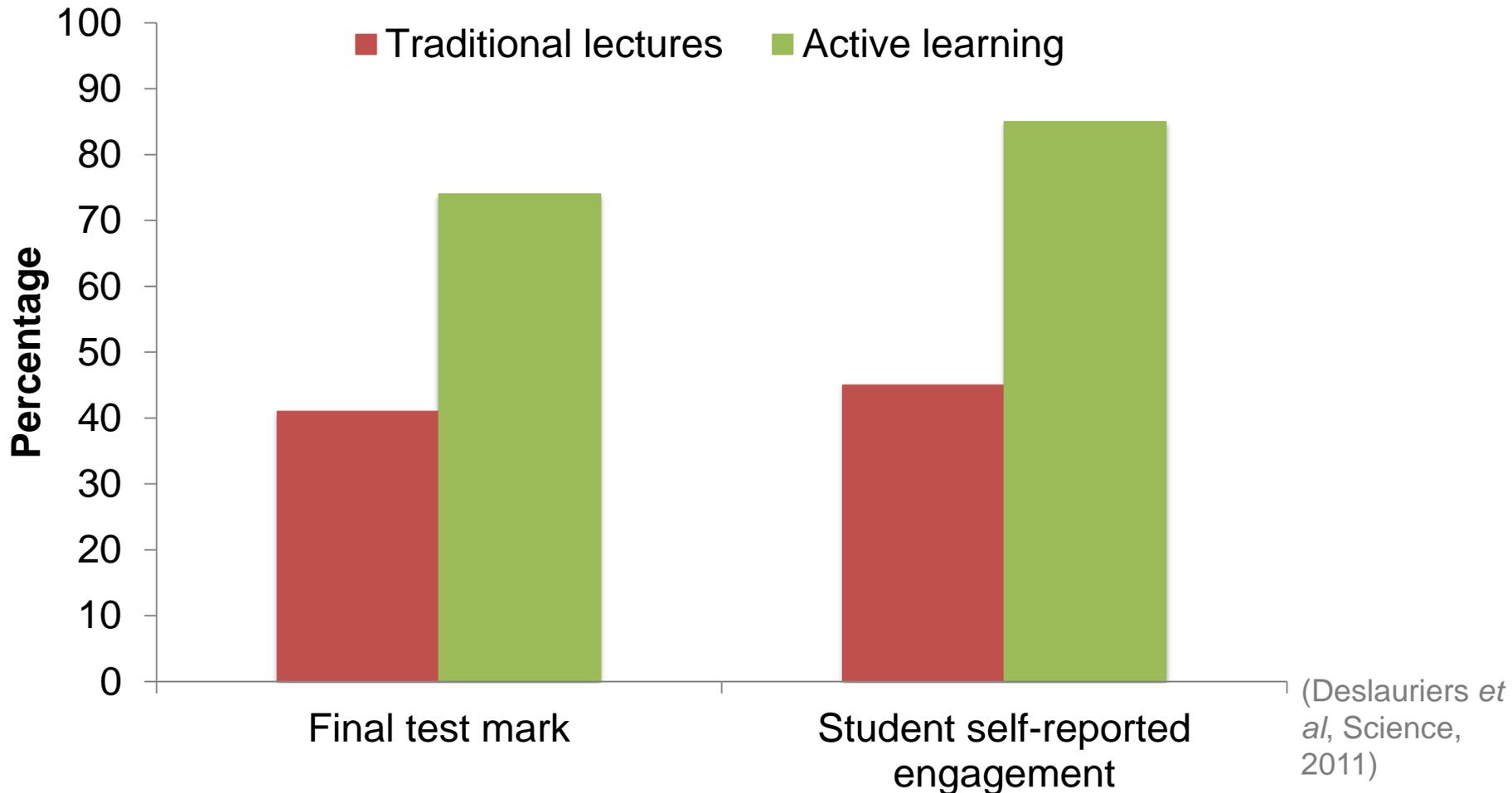
Let's look at some data.

Active learning is less stressful for students

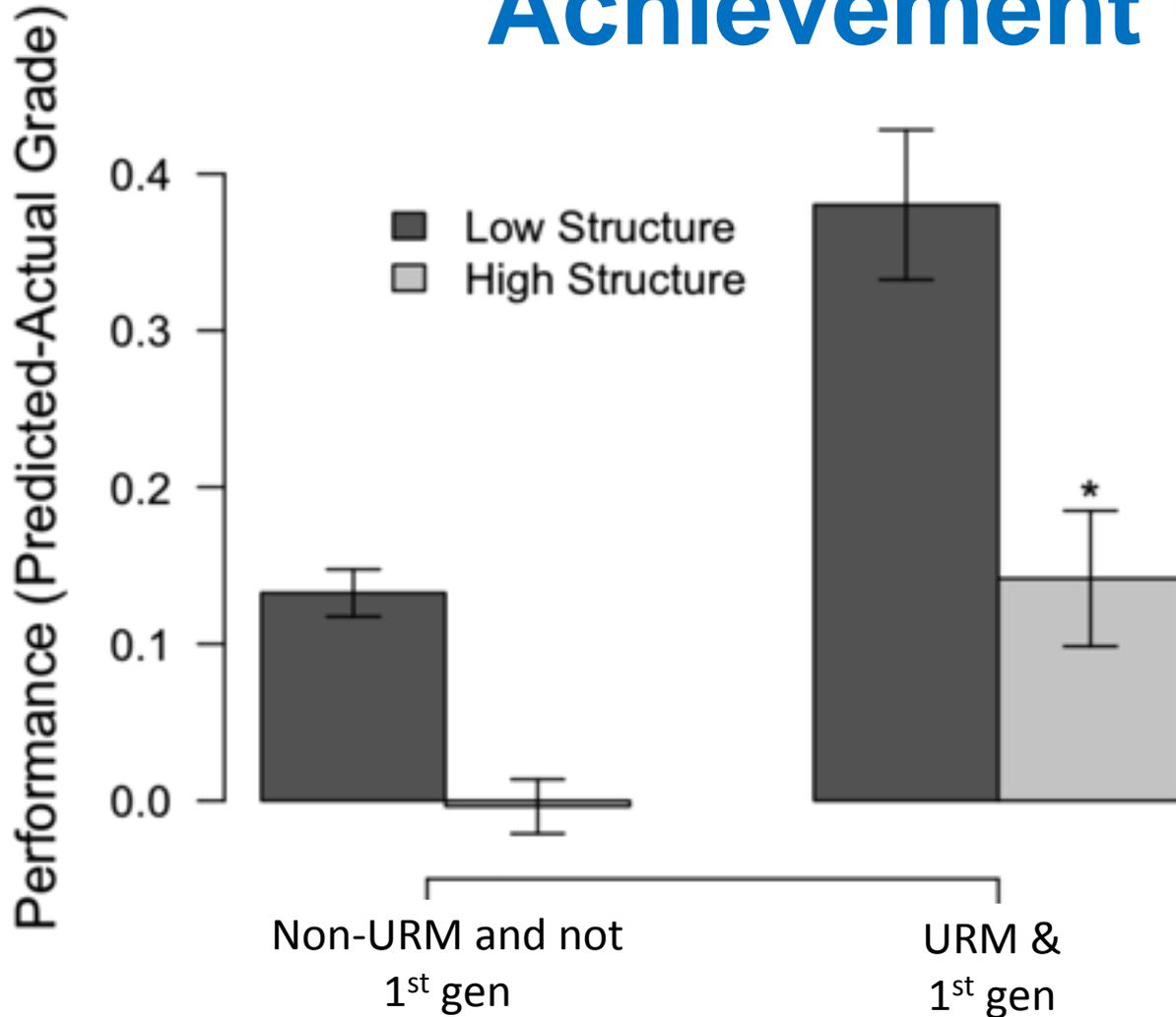


Marlowe, 2012

Students in active classes are more engaged, perform better on tests



Active Learning Reduces the Achievement Gap



More structure:
Active learning-
enhances
performance of
under-represented
minority (URM)
students (and does
not harm non-URM)

Haak et al. 2011.
Science 332(6034), 1213–6.

Similar results found by Eddy et al., 2014.

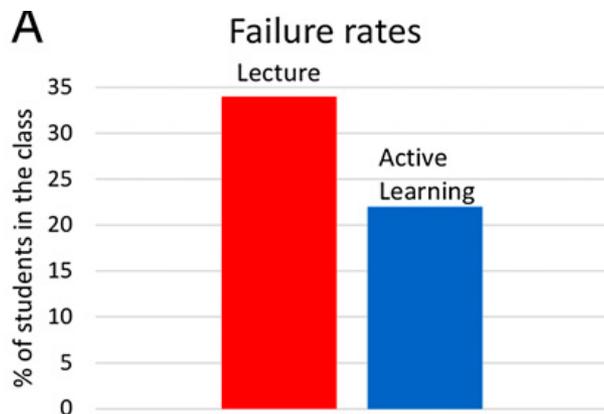
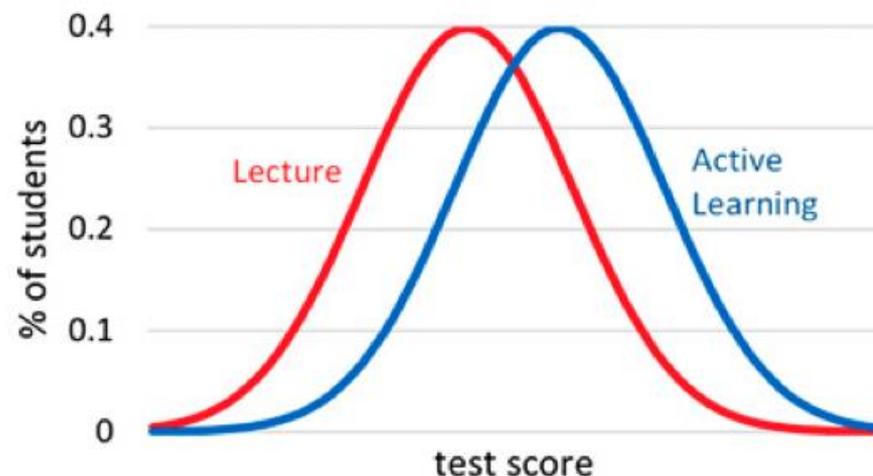
Active learning increases student performance in science, engineering, and mathematics

Scott Freeman^{a,1}, Sarah L. Eddy^a, Miles McDonough^a, Michelle K. Smith^b, Nnadozie Okoroafor^a, Hannah Jordt^a, and Mary Pat Wenderoth^a

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Edited* by Bruce Alberts, University of California, San Francisco, CA, and approved April 15, 2014 (received for review October 8, 2013)

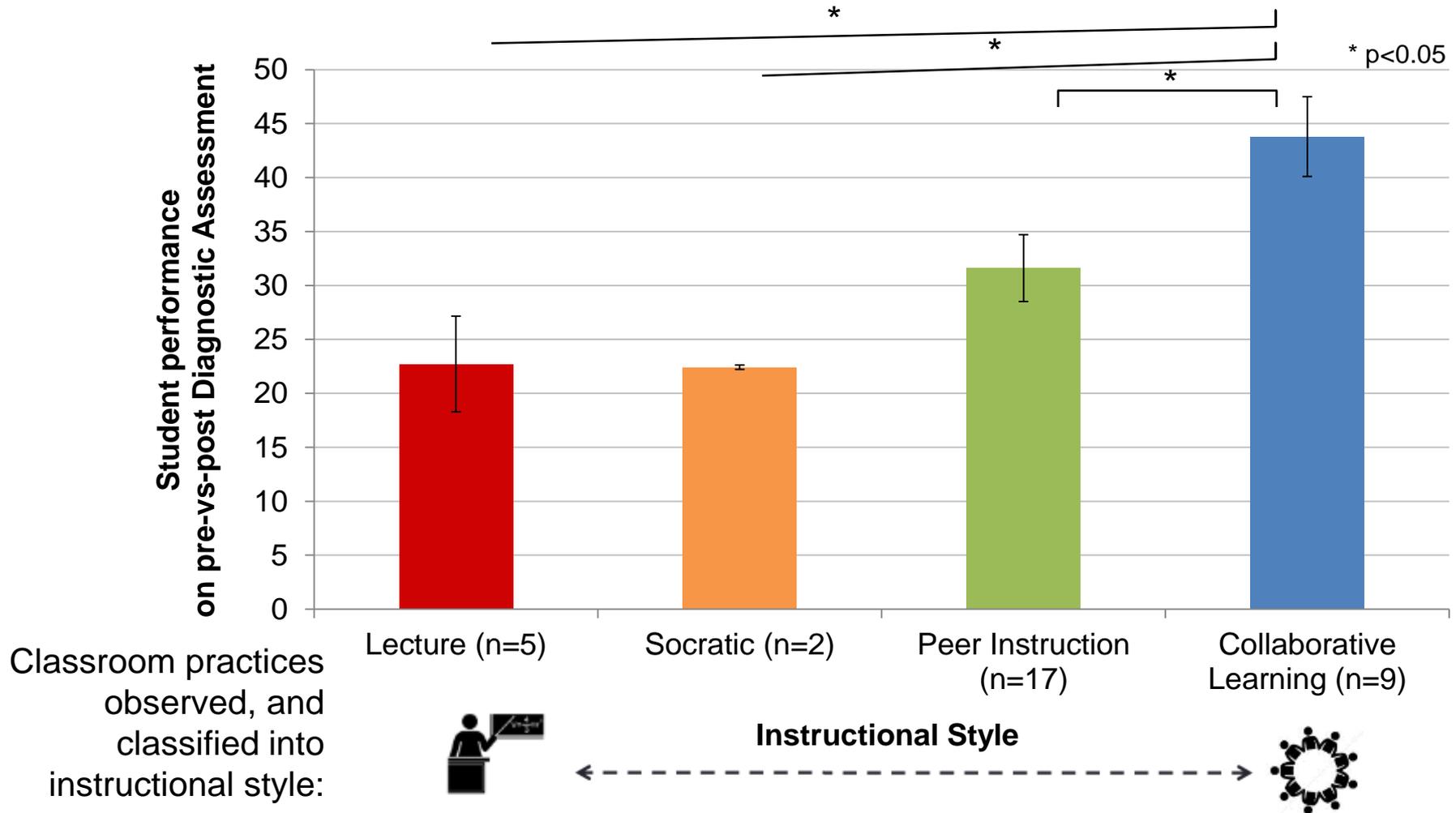
A meta-analysis of 225 studies that compared active learning with lecture-based instruction, on identical exams, in undergraduate STEM courses.



Overall effect size = 0.47

(In introductory STEM, this equates to a 6% increase in exam scores.)

Instructional styles & learning gains – an example from our department



*Clusters/classifications from Lund and Stains 2015;
Normalized change calculations from Marx & Cummings 2007*

In Summary, the data shows:

- Less failure & improved outcomes
- More motivation/interest/engagement
- Reducing gaps between student populations

→ Increased Learning & Retention

What about the benefits to the instructor?

- Avoiding burnout! Always different every time
- Magic moment where you get to be part of them learning!
- Moment where they're stuck and you get to help!
- Trust: giving responsibility of learning to the students, trusting them to learn.
- Empowerment! Self-efficacy
- MORE FUN!
- Build stronger relationships with students.
- Encourages collaboration between instructors!
- We're doing what we ask our students to do!
- Encourages creativity
- I know so much more about what's going on with the students – e.g. misconceptions.
- Rewarding!
- Energy in classroom!

Putting it all together: What are the roles of the instructor in active teaching?

- In groups of 3-4, discuss and write ideas on white boards.
- Gallery walk to see others' ideas – you may add ideas or comments.

What are the roles of the instructor in active teaching?

- Prompt and provoke
- Be ready! Plan your lesson.
- What are you preparing
 - Have tricks up your sleeve
 - Get ideas from peers, benchmarks
- Share expertise
- Instructor expertise is critical. How to know what feedback to give?
 - Observe students
 - Collect information on what students know, and what they have misconceptions on.
- Understanding what it is you want them to know
- Understand their misconceptions
- Understand what steps they need to take to get to expertise
- Make a plan to get them there.

Thank you. Questions?

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Resources!

<http://cwsei.ubc.ca/resources/index.html>

