Paired teaching for faculty professional development

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For more info, please see **Stang & Strubbe (2015)**:
submitted to *Proceedings of the Western Conference on Science Education*;
`http://arxiv.org/abs/1507.05948`

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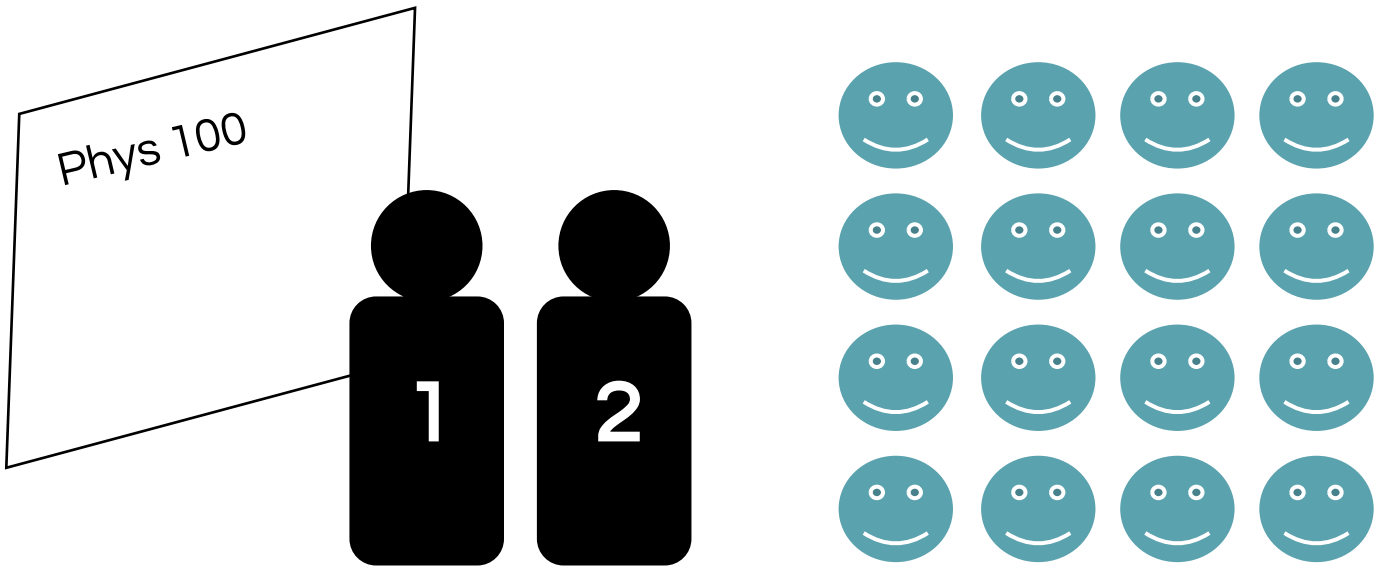
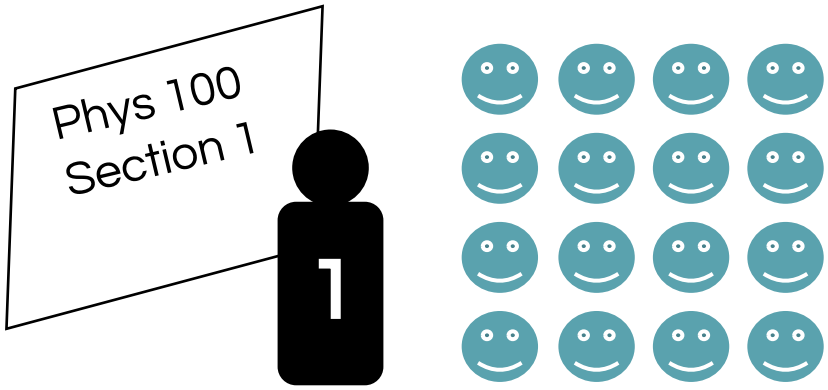
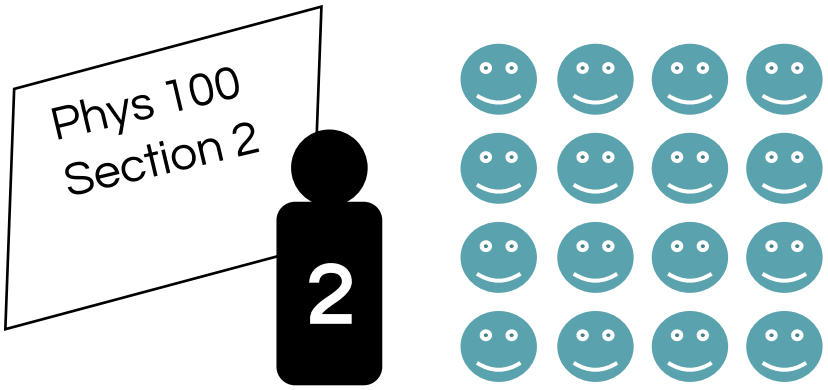
Paired Teaching Program in PHAS at UBC

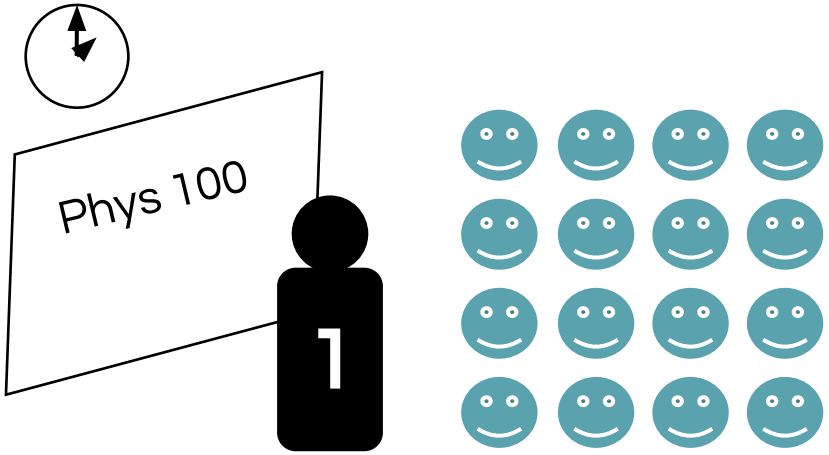


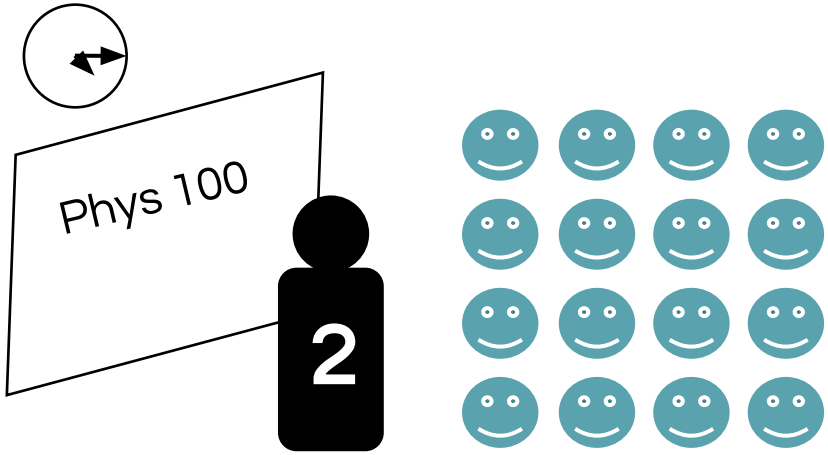
Not *team teaching*





Not *"serial monogamy"*





Why paired teaching

Active learning techniques significantly improve student learning.

(Freeman et al. 2014, “Active learning increases student performance in science, engineering, and mathematics”, *PNAS*, 111(23), 8410-8415)

→ **Short-term goal: Help faculty adopt active learning techniques**

-- by teaching together with another instructor who is experienced in using these techniques

→ **Long-term goal: Improve student learning**

Defining paired teaching

- Both instructors present for ~all teaching activities
- Typically in large first-year lecture courses (in PHAS)
  - Typically in courses that have already been “transformed” to active learning structure
- Interleave teaching through the semester
  - (e.g., topic by topic, first half/second half, or even back and forth throughout each lecture)
- Attend an orientation before school year begins
- Pairs encouraged to meet weekly to discuss and reflect on their teaching (in addition to planning logistical aspects)
- Varying levels of involvement of STLFs:
  - e.g., occasionally observe lectures
  - occasionally attend pair meetings
  - interview each partner before, (maybe during), and after the semester
  - follow up with novice instructor in subsequent teaching

Paired teaching in PHAS

Course (Semester)	# of Instructors (across all sections)	Common course materials used?
PHYS 101 Energy and Waves (Spring 2013)	4	Yes
PHYS 101 Energy and Waves (Spring 2014)	4	Yes
PHYS 101 Energy and Waves (Spring 2015)	4	Yes
PHYS 102 Electricity, Light and Radiation (Spring 2015)	4	Yes
PHYS 117 Dynamics and Waves (Fall 2015)	2	One section (New course)
PHYS 158 Introductory Physics for Engineers II (Spring 2016)	4	Yes
PHYS 170 Mechanics I (Spring 2016)	4	No
PHYS 101 Energy and Waves (Spring 2016)	4	Yes

Theoretical background: Paired teaching is rooted in an apprenticeship paradigm

Behaviour paradigm

- Novices and experts are on the same scale
- Novices need to acquire more tools

Development paradigm

- Novices and experts have different personal theories
- Novices become experts through perturbation of their personal theories

Apprenticeship paradigm

- Novices and experts are from different worlds
- Novices acculturate into world of the expert

Farnham-Diggory, Sylvia. "Paradigms of knowledge and instruction." *Review of Educational Research* 64.3 (1994): 463-477.
Henderson, Charles, Andrea Beach, and Michael Famiano. "Promoting instructional change via co-teaching." *American Journal of Physics* 77.3 (2009): 274-283.

Theoretical background: Strategic knowledge is important for teaching expertise

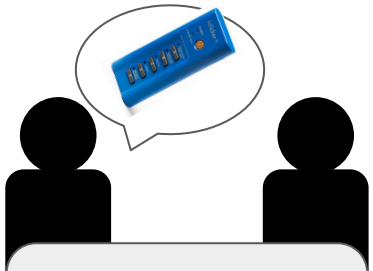
Domain Knowledge

55/45 split
⇒ revote

Heuristic Strategies

55/45 split
after revote?!

Control Strategies



Learning Strategies

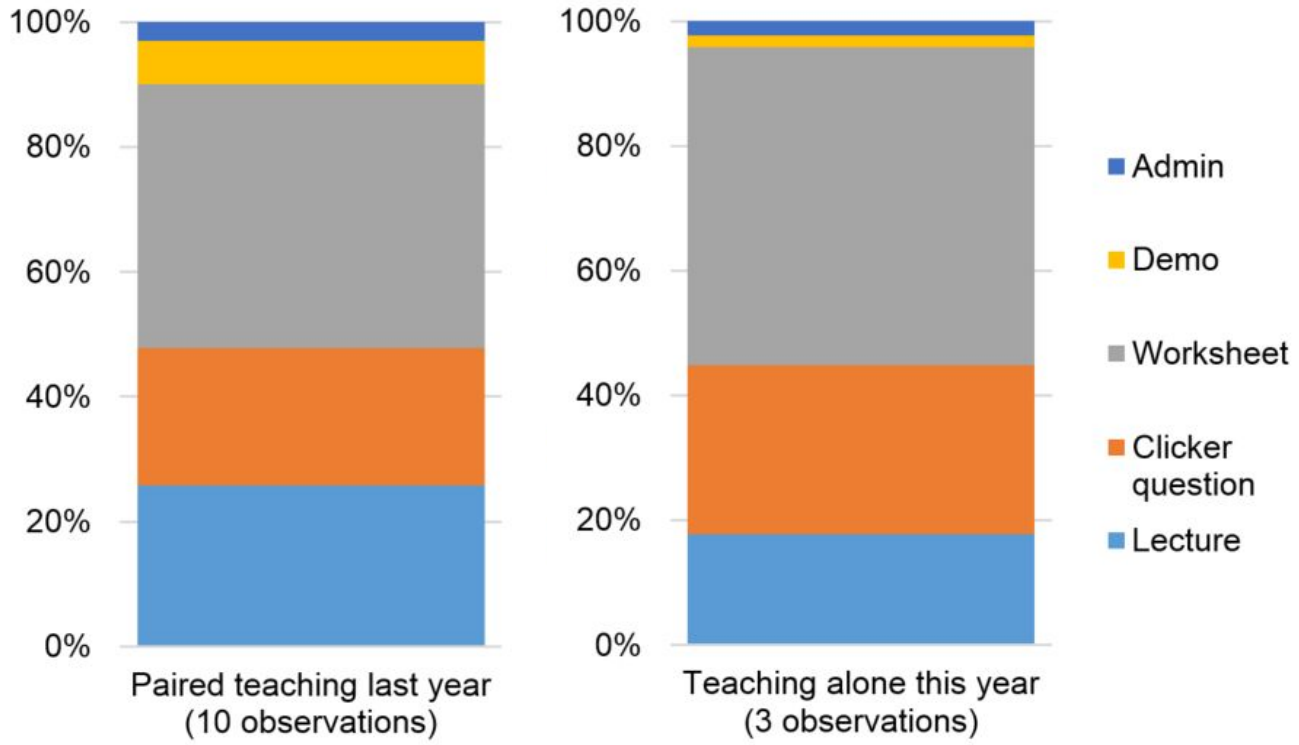
Strategic knowledge
- Often tacit
- Varies with context

Apprenticeship paradigm: Actual participation in expert's world is critical for transfer of strategic knowledge.

Collins, Allan, John Seely Brown, and Ann Holum. "Cognitive apprenticeship: Making thinking visible." *American educator* 15.3 (1991): 6-11.
Henderson, Charles, Andrea Beach, and Michael Famiano. "Promoting instructional change via co-teaching." *American Journal of Physics* 77.3 (2009): 274-283.

Observation Results
A case study of Professor X: In PHYS 1XX

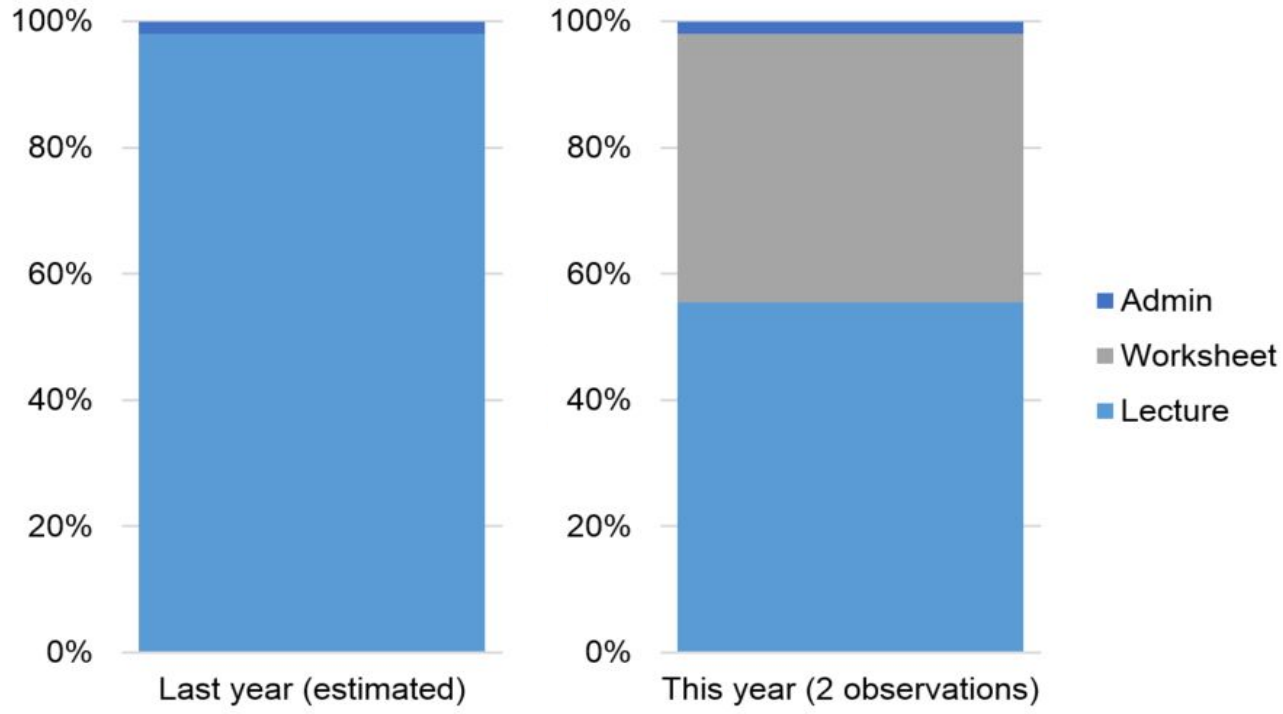
Professor X, last year: “When we go in next year, I would advocate to keep the general format… This sort of interplay of elements, between five, ten minutes of lectures, worksheets, some demos, some PhETs.”



When teaching alone, Professor X **continued** to use the same teaching techniques as when paired teaching.

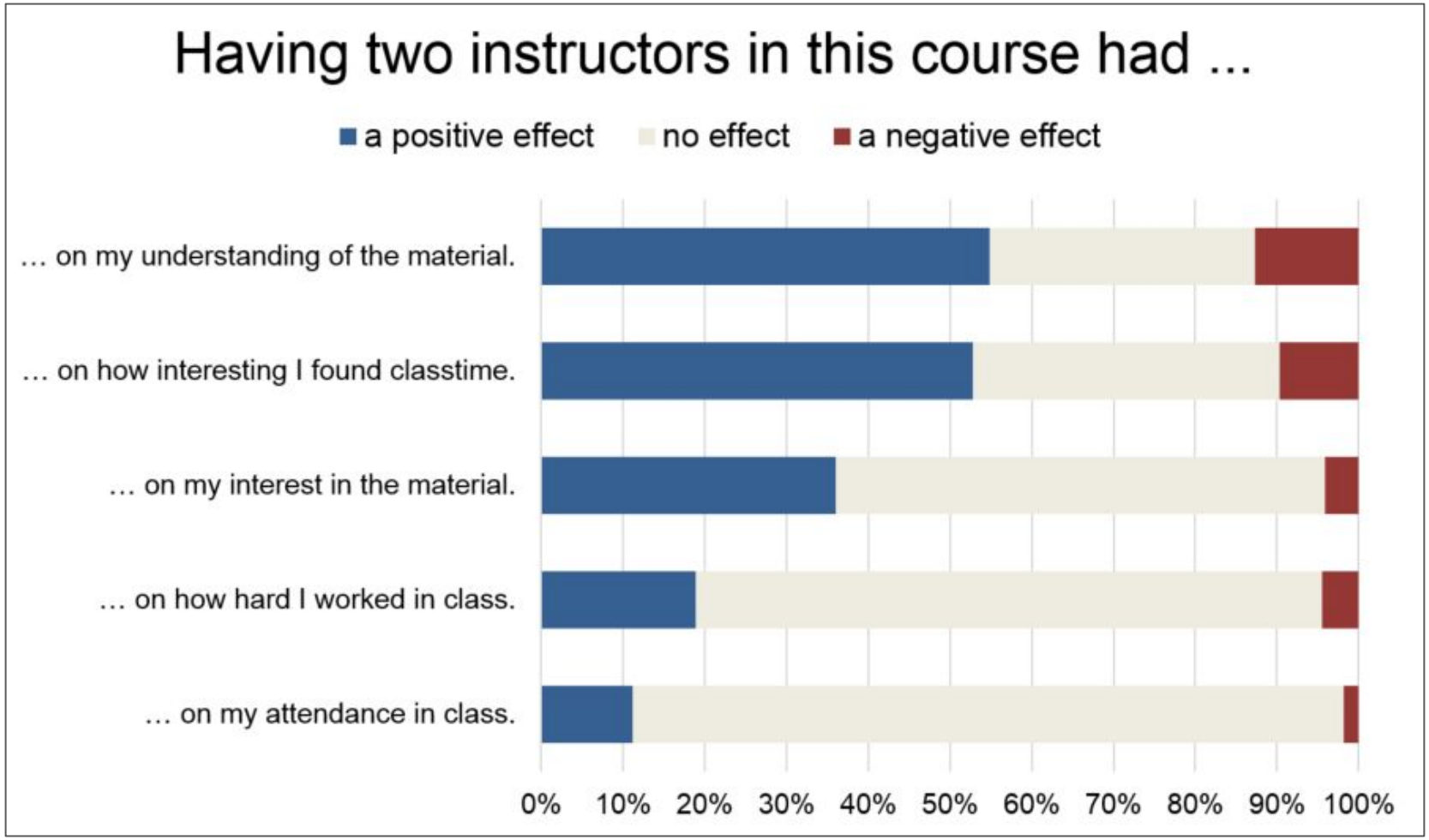
Observation Results
A case study of Professor X: In PHYS 3XX

Professor X, last year: “Next year I’m going to do Phys 3XX again, and I’ll probably try to transform that… I will try to see if I can develop guided worksheets” in order to “try and let them work things out more directly with their own brains.”



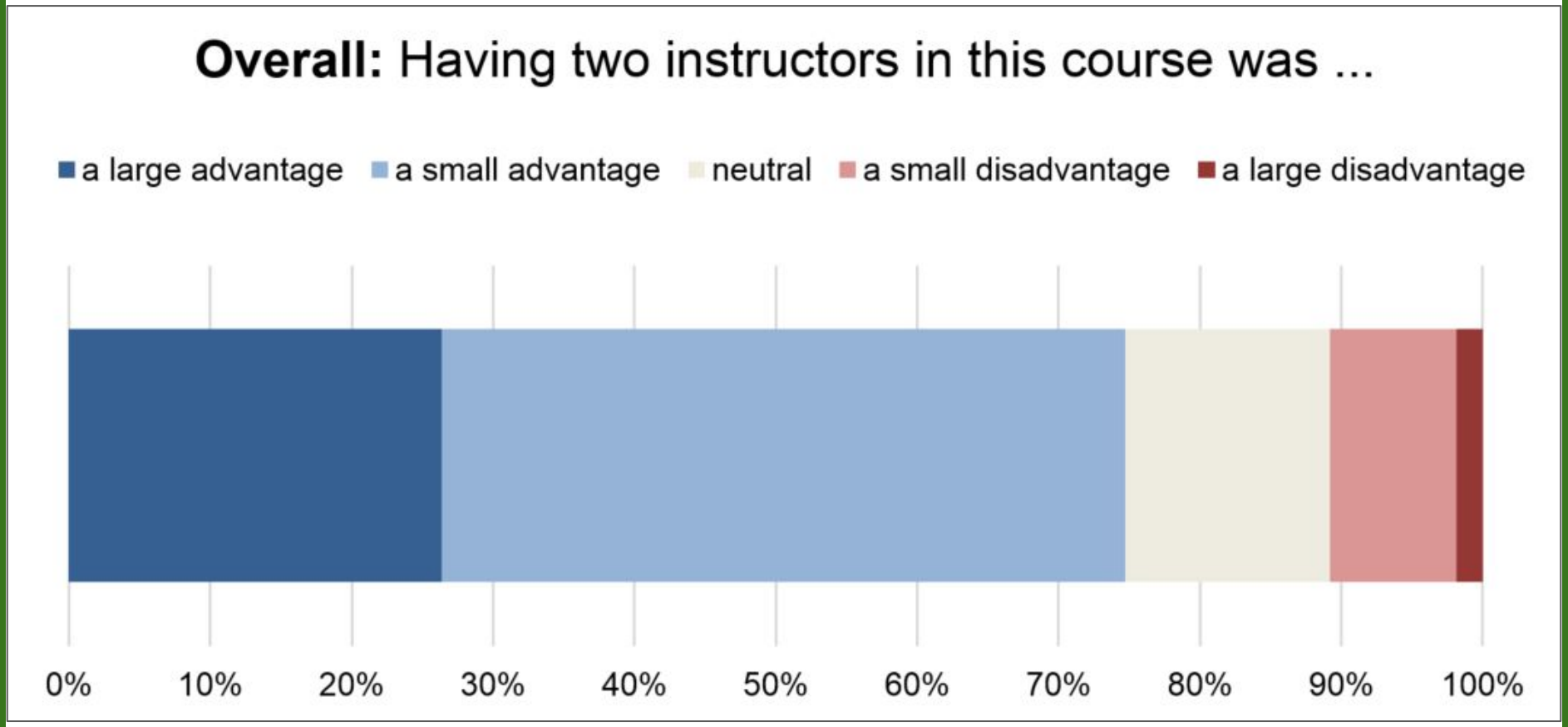
Professor X **transferred** the use of active techniques to their upper year course.

Student Survey Results (N = 269, from 2 courses)



Students felt that having two instructors had a **positive** effect on what they got out of class.

Student Survey Results (N = 269, from 2 courses)



Compared to courses with one instructor, students felt that having two instructors was overall an **advantage**.

Interview Results (so far)

Four areas which appear to influence effectiveness of paired teaching:

- Approach / goals of novices towards paired teaching
  - Likely related to prior teaching experience
- Using existing materials for a transformed course makes it easier to start using active learning techniques
- Sequence of teaching assignments
- Relationship between teaching partners

Results from: **Stang & Strubbe (2015)**; submitted to Proceedings of the Western Conference on Science Education; http://arxiv.org/abs/1507.05948

Summary:
Preliminary recommendations to department:

- Ask instructors to volunteer (or even apply) to pair-teach
- Place teaching pairs in courses where interactive materials already exist
- Think carefully about future teaching assignments
- Hold an orientation for teaching pairs:
  - Clarify expectations
  - Support deciding on professional development goals
  - Encourage informal interaction before course starts
  - Encourage weekly reflection meetings