

Francis Jones, Dep't Earth Ocean and Atmospheric Sciences, with thanks to all students taking EOAS courses in fall 2013 and spring 2014 and their instructors.

## SLES – the Students' Learning Experiences Survey

- 2500 students in 50 courses rated the helpfulness of 39 specific teaching or learning strategies in the final year of a 7-yr dep't-wide education initiative.
- All 39 questions: "How much did {information provided} {classroom strategies} {various types of homework} help you learn in this course?"  
Options: a. Extremely helpful b. Very helpful c. Moderately helpful d. Little or no help e. Not Applicable
- 4 course improvement models: t = multi-term "transformation", c = "consulting" with CWSEI, i = "independent" (no CWSEI support), n = "none" (no improvement).
- 3 class sizes: small < 50 (27 courses); medium < 150 (18 courses); large > 150 (9 courses).

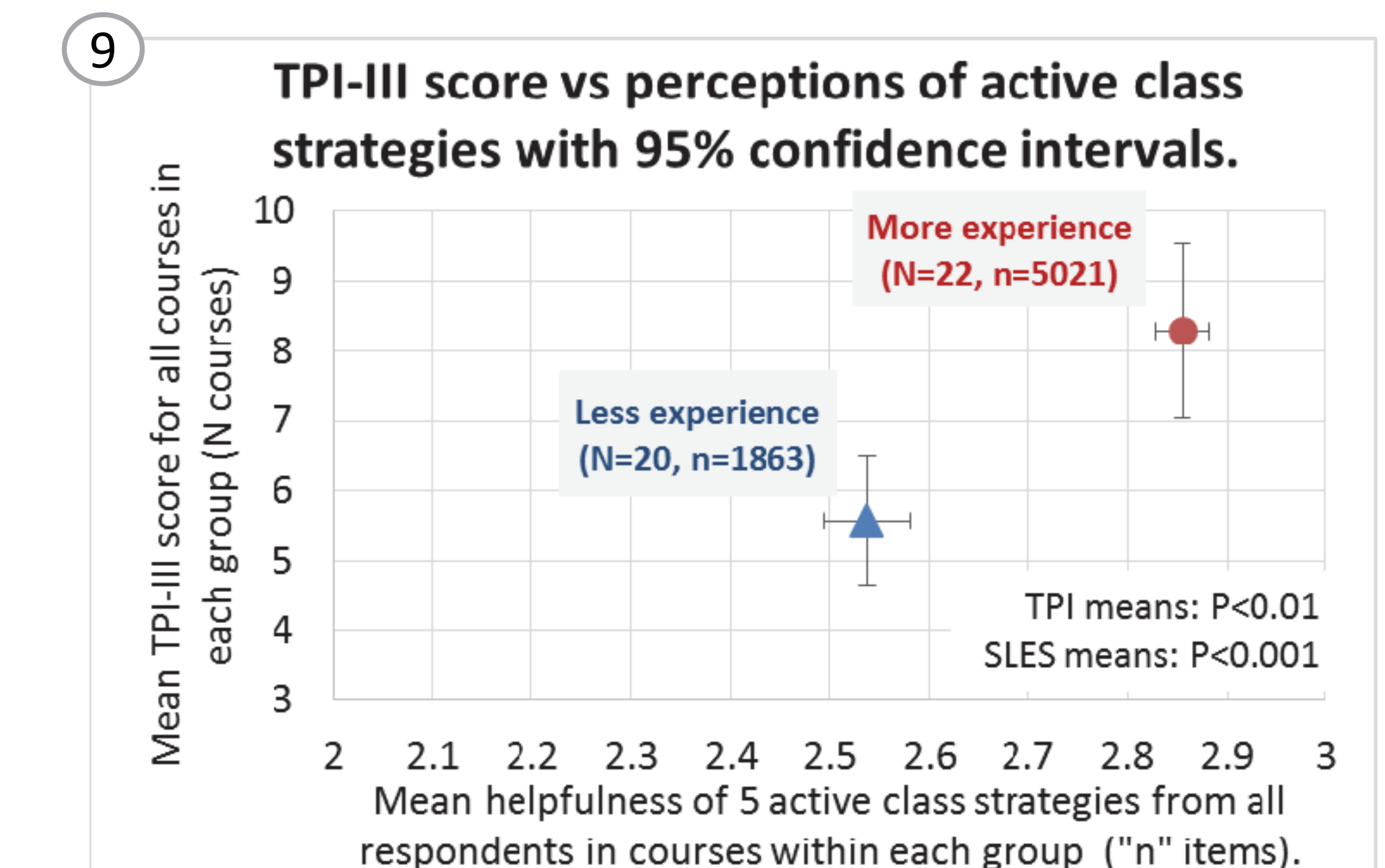
## Study Questions

- How were students' perceptions of helpfulness related to course improvement model, class size and year level of courses?
- Which specific teaching or learning strategies were perceived as most or least helpful?
- How do STUDENTS perceptions align with OTHER data such as classroom observations and instructor's teaching practices?

## Data summary

	1st year courses			2nd year courses			3rd year courses			4th year courses		
	N	TR	RR	N	TR	RR	N	TR	RR	N	TR	RR
Transformed	6	496	29%	5	290	52%	9	369	50%	1	16	94%
Consulted	1	60	29%	2	54	73%	1	23	61%	6	123	55%
Independent	0	-	-	3	131	77%	3	242	72%	3	47	84%
None	1	64	47%	1	50	85%	4	136	55%	9	184	64%

## Perceptions vs TPI (Teaching Practices Inventory)



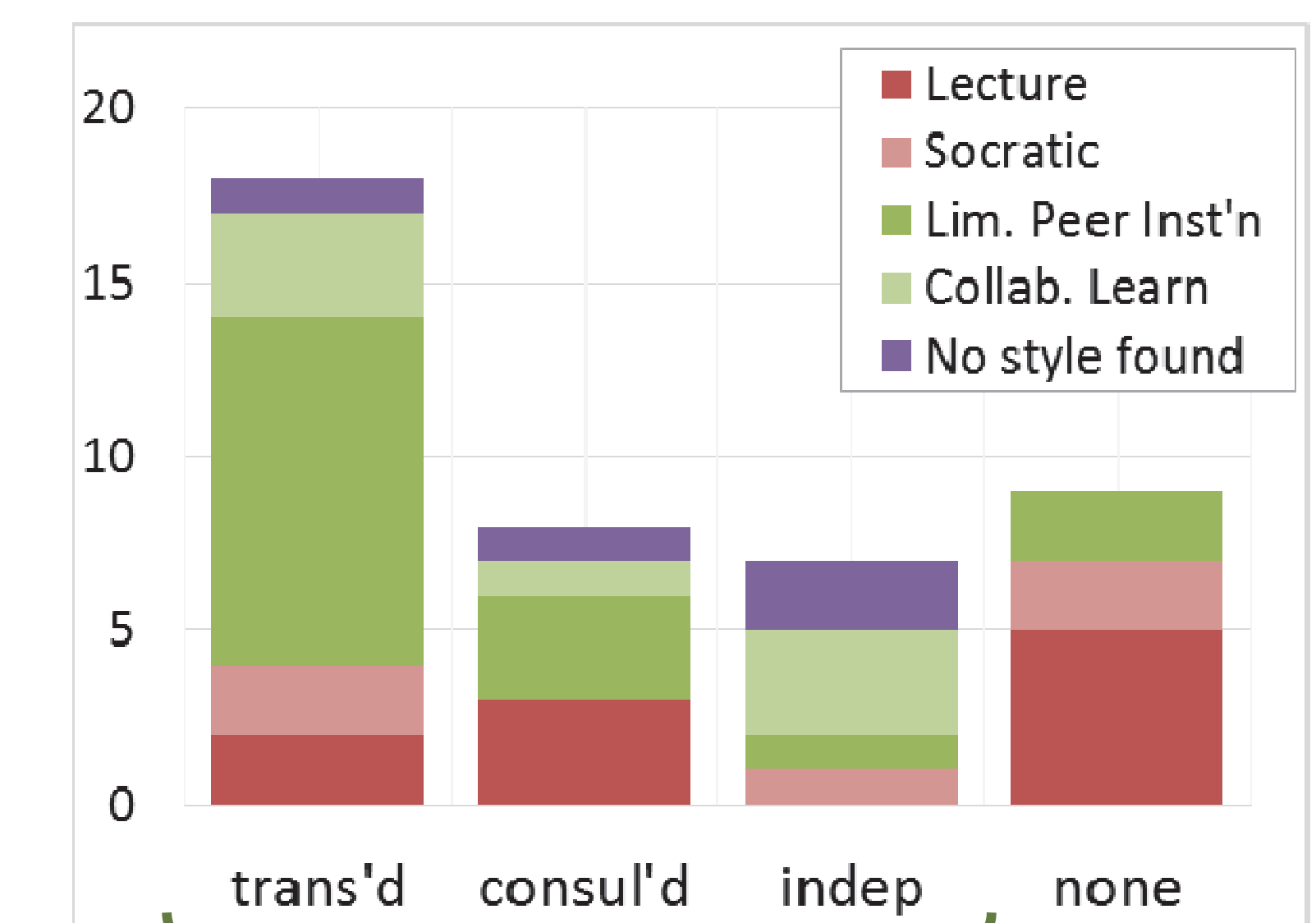
Compare TPI classroom practices only (TPI-III) and SLES results for active classroom strategies only. Instructors with "less" or "more" pedagogic experience were classified independently by 3 science-education experts.

**Interpretation:** Students perceive active classroom practices as more helpful when taught by instructors with more EBIP experience.

## Perceptions vs COPUS (Classroom Observations)

### 10 Number of courses found to be in each COPUS category

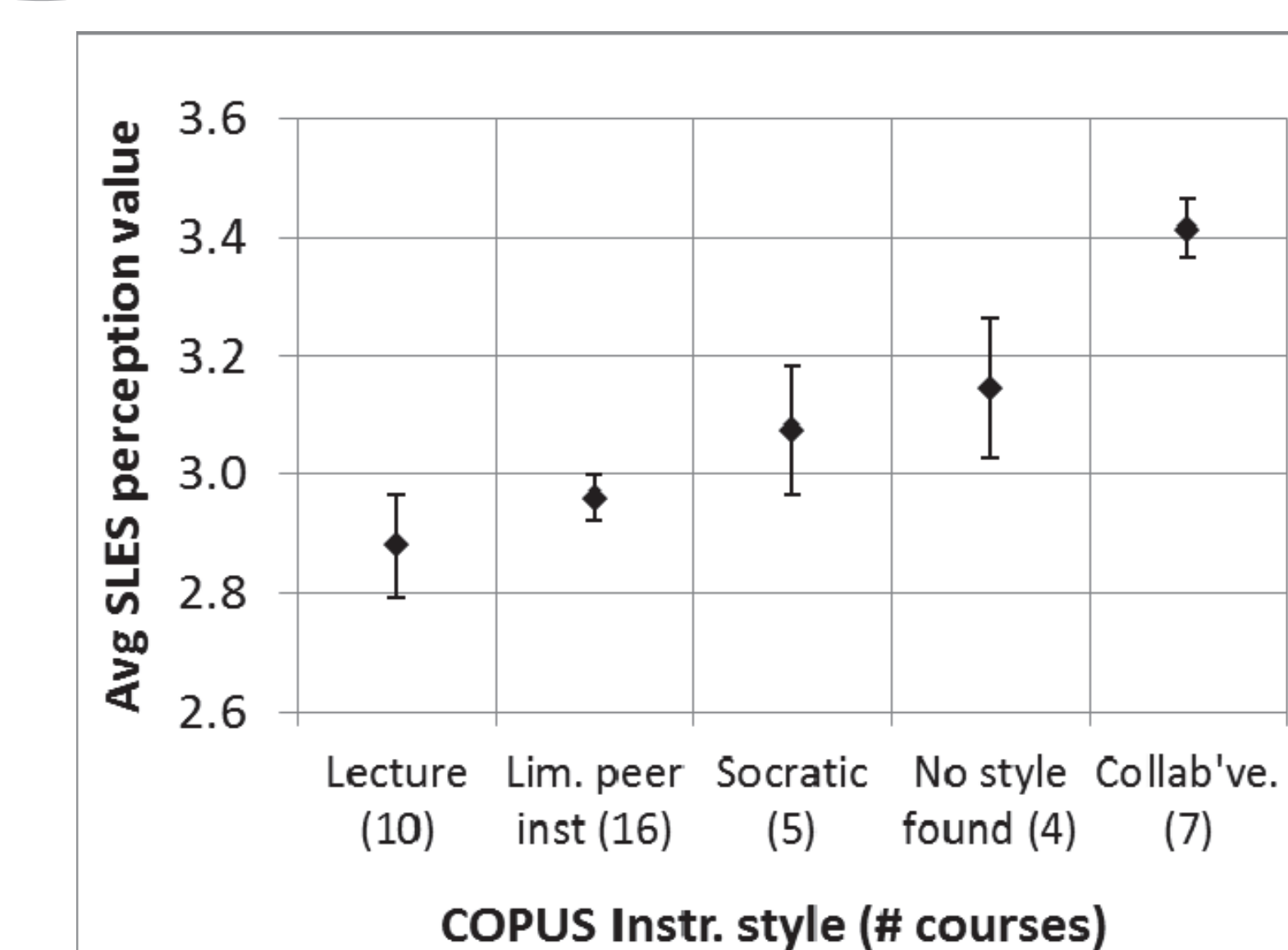
COPUS "Instructional Style" for each of 37 observed courses found via Lund et al., 2015.



### Interpretations:

- Improved (t, c, i) courses: mostly L, P, I, or Collab. Learning styles.
- Unimproved (none) courses mostly Lecture or Socratic styles.
- Most courses with No Style Found were "i" - independently improved.

### 11 Max perceived helpfulness from 5 active classroom strategies

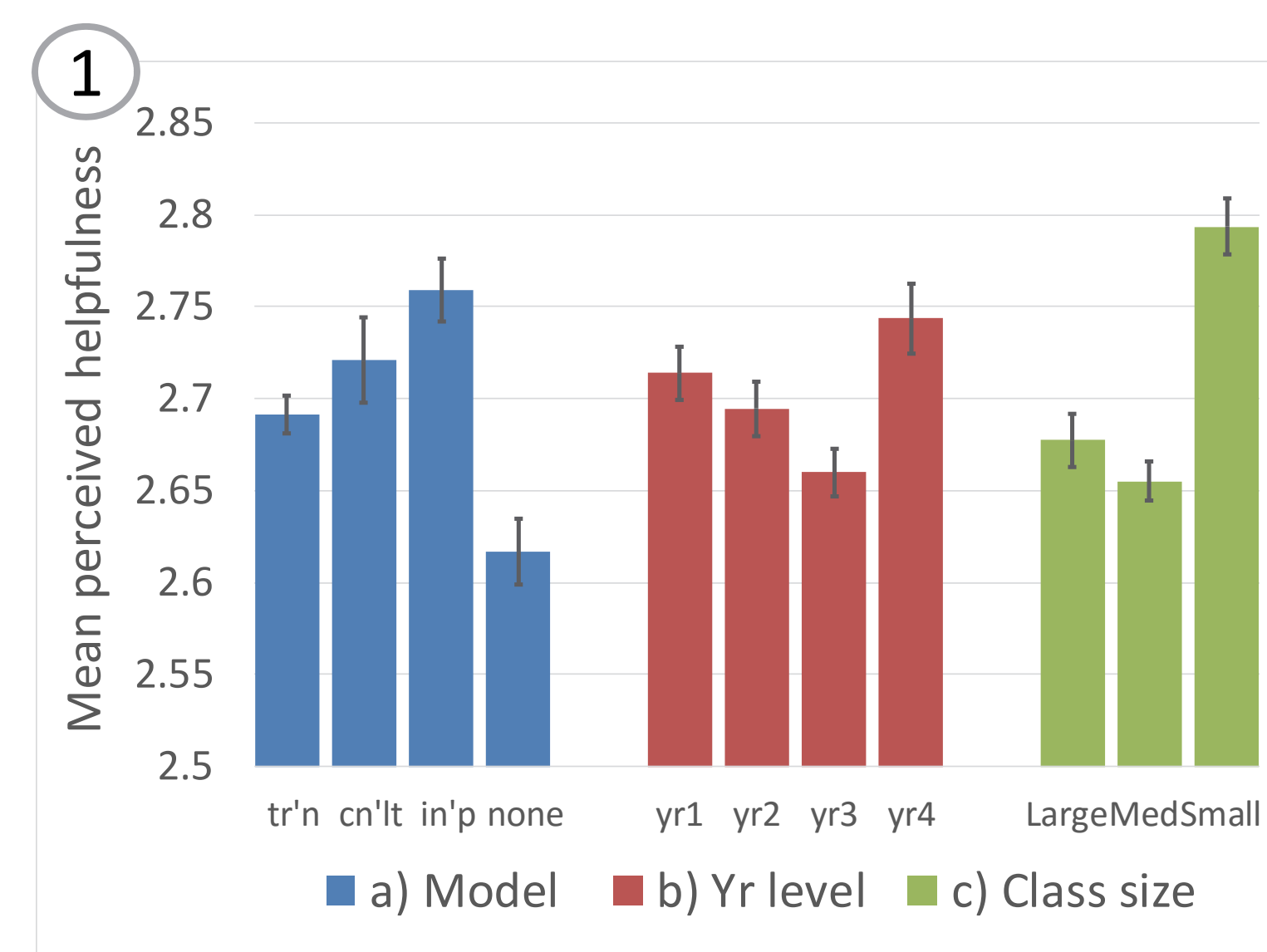


### Processing steps:

- For each course, find mean perception for each of 5 active classroom strategies.
- For each course, find max. of these 5 means.
- Plot average of these maximum values for all courses within each COPUS style.

**Interpretation:** Students perceive active classroom practices as more helpful in classes observed to be more active. Lower SLES result for "limited peer instruction" courses may be due to significantly larger class sizes. (Also, "Socratic" style may be slightly different at UBC compared to Lund et al, 2015).

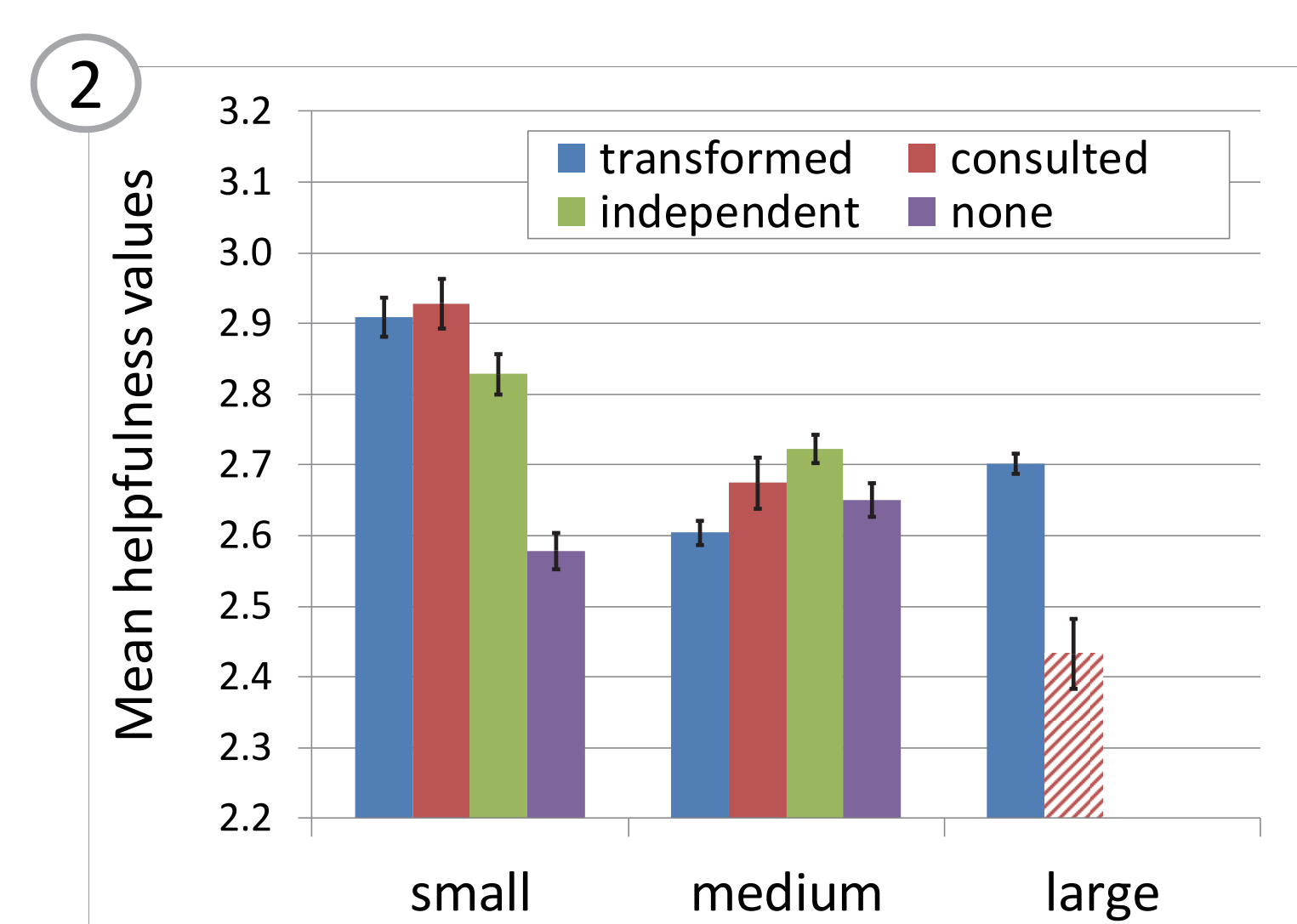
## Aggregate Perceptions



a) Model	b) Year level	c) Class size
t-c	yr1-yr2	la-me*
t-i***	yr1-yr3***	la-sm***
t-n***	yr1-yr4	me-sm***
c-i*	yr2-yr3**	-
c-n***	yr2-yr4***	-
i-n***	yr3-yr4***	-

\* for Padj < 0.05;  
\*\* for Padj < 0.01;  
\*\*\* for Padj < 0.001.

1) Mean perceived helpfulness aggregated by improvement type, year level and class size. Results averaged over all respondents with 95% confidence intervals.



small	medium	large
t-c	t-c*	t-c***
t-i***	t-i***	-
t-n***	t-n**	-
c-i***	c-i	-
c-n***	c-n	-
i-n***	i-n**	-

2) Mean perceived helpfulness aggregated by class size (95% confidence intervals), including responses to all questions from all respondents. Patterned result (large, consulting) is from one course only.

## Interpretations from figures 1 - 2

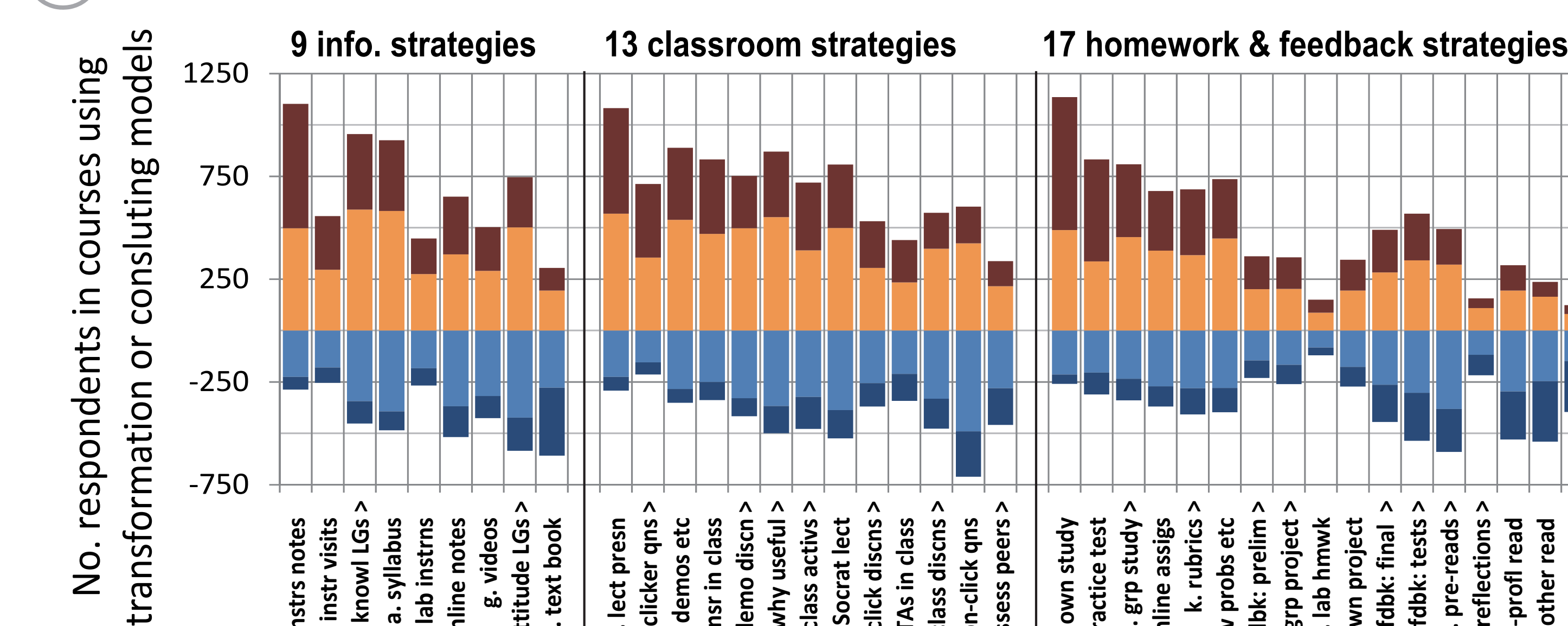
- Overall, strategies were perceived as least helpful in unimproved courses and similarly helpful in courses improved using any of 3 models.
- Small courses improved with STLF ('t' and 'c') support were more helpful than independently improved courses.
- The opposite was found for medium courses.
- Helpfulness of strategies in large courses (all transformed) was perceived as similar to medium courses.
- 1<sup>st</sup> and 4<sup>th</sup> yr courses were equally "helpful". 3<sup>rd</sup> yr courses were least "helpful".

## Overall conclusions

- Students perceived improved courses as more helpful than unimproved courses.
- STLFs helped faculty gain pedagogic expertise: i.e. students perceived most improved courses to be as helpful as those taught by specialist geoscience educators.
- Benefits did not always scale with class size; SLES data indicate that scaling homework & feedback for larger classes is particularly challenging.
- Classroom strategies were perceived as more helpful in courses taught by instructors who indicate they use more best practices.
- Classroom strategies were more helpful in courses observed to be more active.

## Perceptions of individual teaching / learning strategies

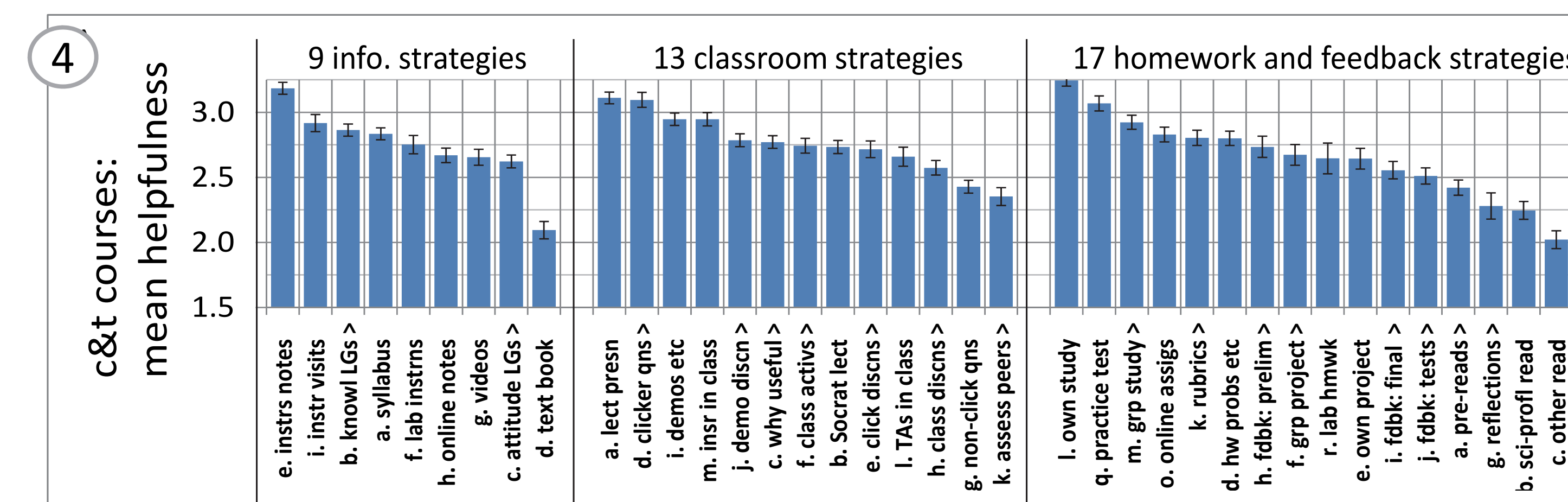
3) No. respondents in courses using transformation or consulting models. Legend: Mod.Helpful, LittleNoHelp, VeryHelpful, Ext.Helpful. ("Not applicable" responses were removed for all analysis.)



3) Likert scale data for 39 questions from 1410 respondents in courses improved using either consulting (c) or transformation (t) models. Sorted to match figures below.

Carat ^ identifies strategies loosely defined as "evidence-based instructional practices".

This reveals prevalence of each strategy.



### 4) Mean helpfulness from Figure 3

Sorted by "helpfulness" within 3 categories:  
1. Information provided (9 questions)  
2. Classroom strategies (13 questions)  
3. Homework or feedback strategies (17 qns)  
Includes 95% confidence intervals.

### Compare helpfulness by intervention

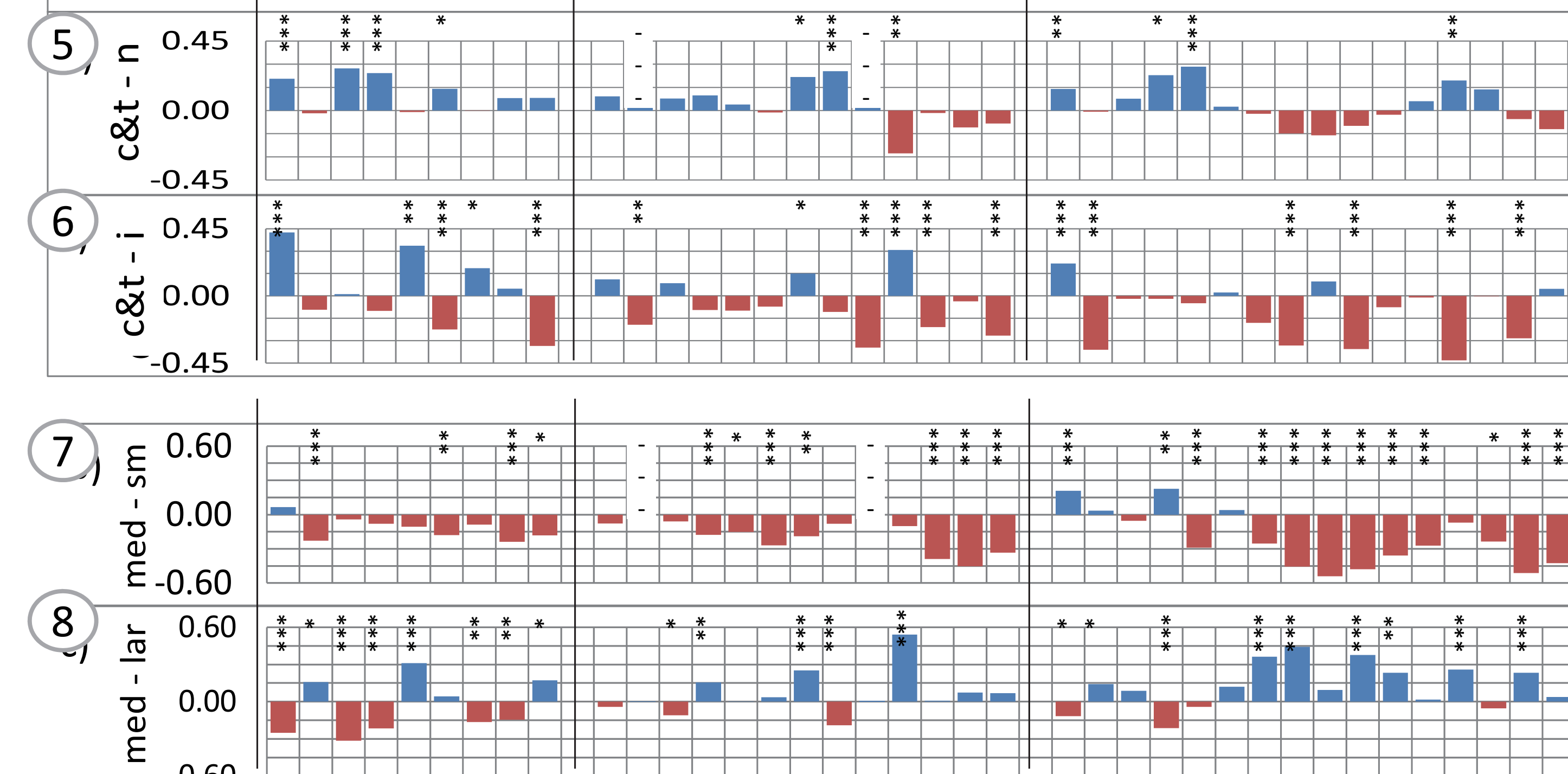
5) Differences between means from combined "c" & "t" courses and "n" courses. (No clickers in "n" courses.)

6) Differences between means from combined "c" & "t" courses and "i" courses.

### Compare helpfulness by class size

7) Difference between means from medium and small course. (No clickers in sm courses.)

8) Difference between means medium and large classes.



All significance symbols: \* for Padj < 0.05; \*\* for Padj < 0.01; \*\*\* for Padj < 0.001  
Significance between trios of mean values via one way ANOVA then TukeyHSD post-hoc tests.

## Interpretations from figures 3 - 8

- Perceived helpfulness of individual strategies was nuanced and context dependent. Both "traditional" and EBIP were improved.
- Top 3 most helpful are "traditional" + Learning Goals, Clickers & Group study (fig 3, 4).
- Most strategies perceived as more helpful in "c&t" compared to "n" (fig 5).
- Most were more helpful in "i" compared to "c&t", BUT - exceptions are interesting (eg clickers) (fig 6).
- Feedback / homework strategies were most helpful in "i" courses (fig 6) and small courses (fig 7).
- Nearly all strategies were "more helpful" in small courses compared to medium; 2 exceptions are interesting (fig 7).
- Medium and large classes were more variable; homework/feedback was more helpful in medium courses (fig 8).