

# Assessing a GTA Professional Development Program

Emily Alicea-Muñoz<sup>1</sup>, Joan Espar Masip<sup>2</sup>, Carol Subiño Sullivan<sup>3</sup>, Michael F. Schatz<sup>1</sup>



<sup>1</sup> School of Physics, Georgia Institute of Technology  
<sup>2</sup> Facultat de Matemàtiques i Estadística, Universitat Politècnica de Catalunya  
<sup>3</sup> Center for Teaching and Learning, Georgia Institute of Technology



## Introduction & Methods

Graduate teaching assistants (GTAs) are essential teaching staff for intro physics courses.

- GTAs supervise as much as half of the students' in-class contact time [1]

**Providing GTAs with adequate preparation and support for teaching is crucial.**

- Preparation has positive impact on teaching effectiveness [2-4]
- Teaching experience improves graduate students' research skills [5]

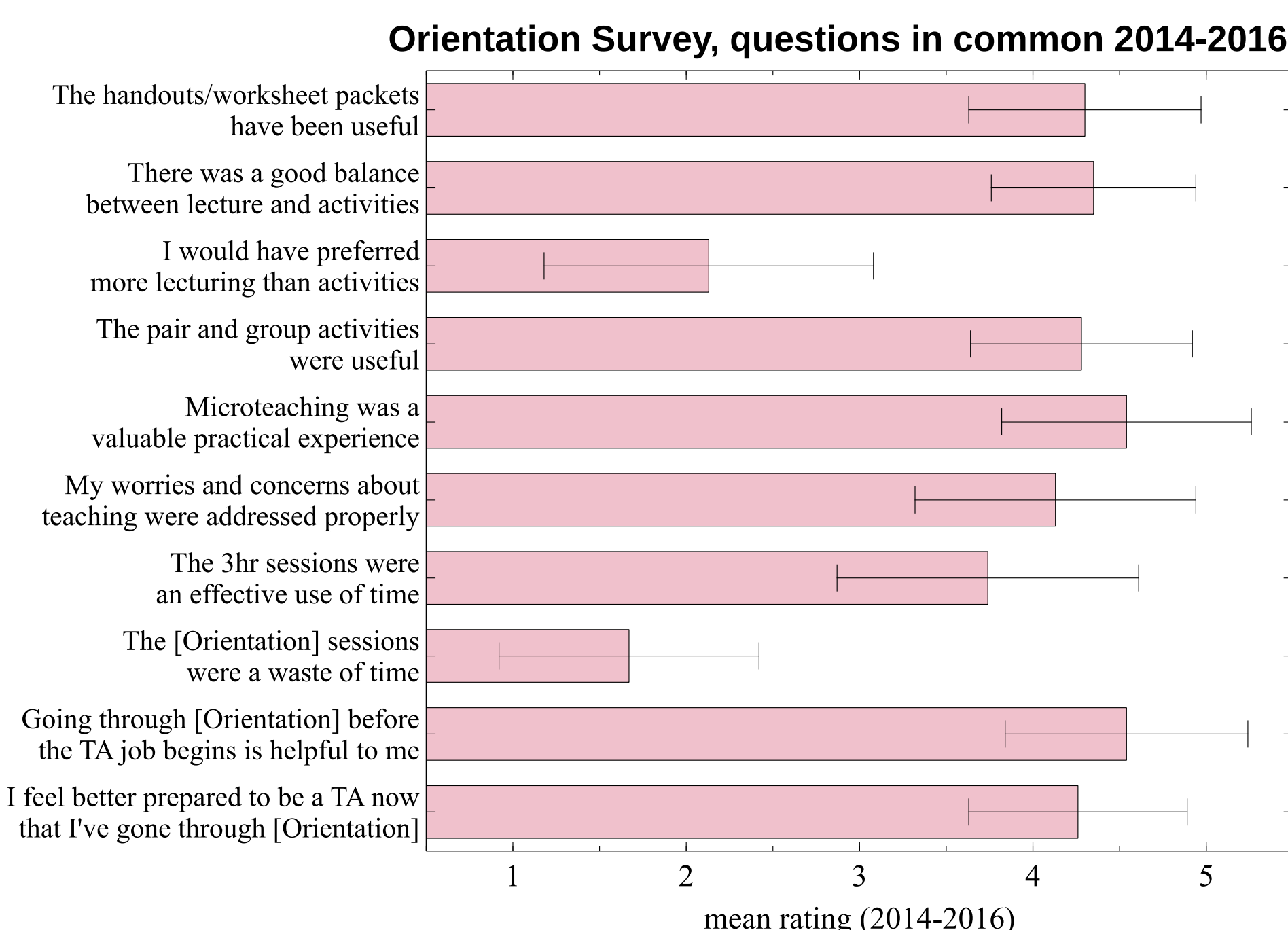
### Physics GTA Preparation at Georgia Tech

- 92 grad students since 2013
- Integration of physics, pedagogy, and professional development strategies**
- Major goals:
  - GTAs develop and apply learner-centered teaching
  - Give/receive feedback
  - Manage classroom dynamics
  - Identify transferable skills useful for their future careers

### Assessment

- Orientation Survey** - evaluate course content and determine self-confidence for teaching
- Approaches to Teaching Inventory (ATI)** - pre/post research-validated instrument [6] to assess attitudes about teacher-centered and student-centered practices
- Final Survey** - evaluation of all course topics and activities at the end of the semester
- Student Evaluations** - end-of-semester evaluations of teaching completed by undergraduate students in intro physics labs/recitations

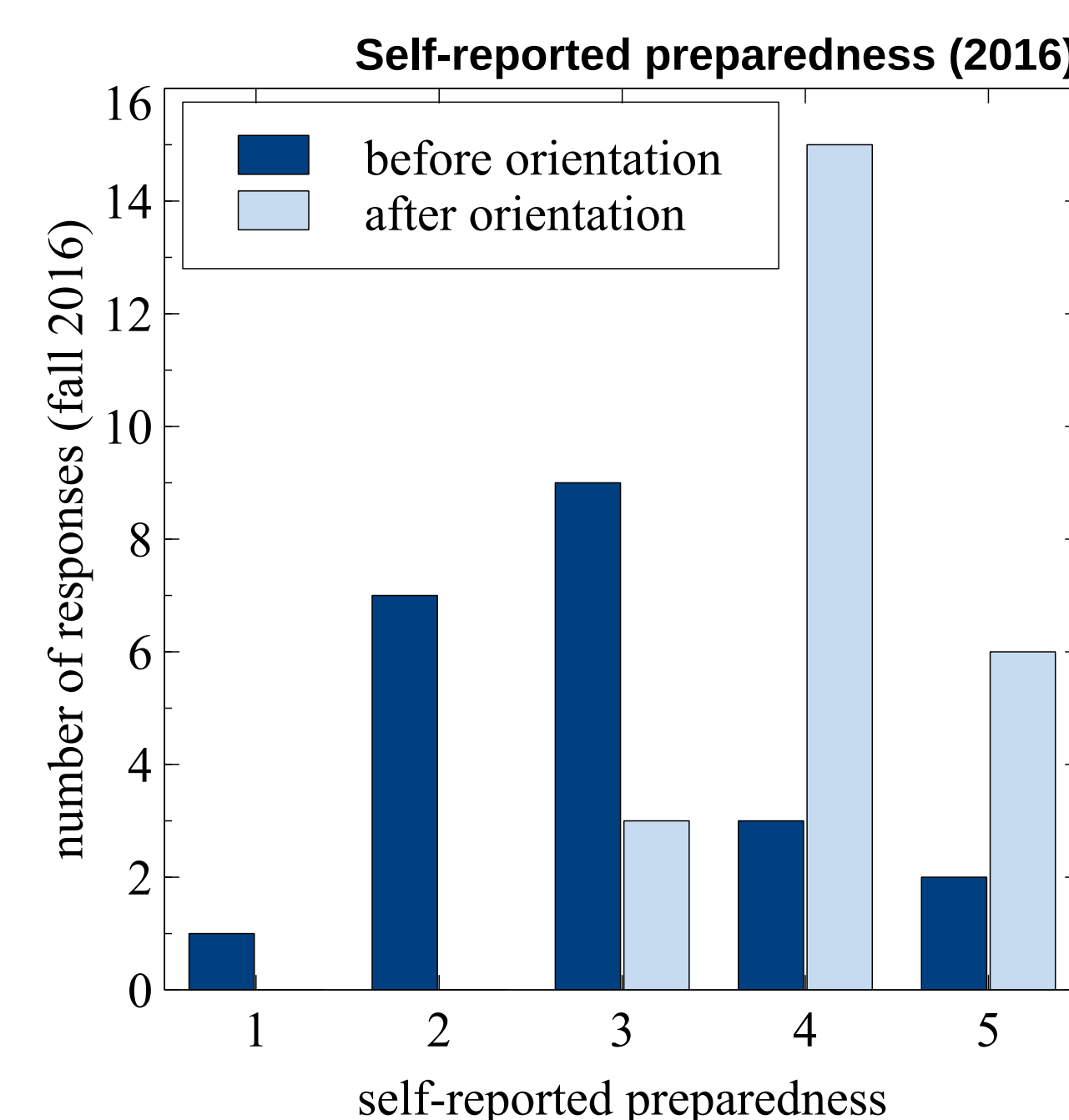
## Orientation Surveys



- GTAs consider **Orientation useful and valuable** (Likert survey)

- "How prepared do you feel for your first GTA assignment at Georgia Tech?" before and after Orientation (2016)

- GTAs feel better prepared for teaching after going through Orientation (2-sample K-S test,  $p < 0.001$ )



## Final Surveys

- (2013-2014) GTAs asked to identify their top 3 most useful course topics

Final survey top 3 (2013-2014)			
Rank	2013	2014	
1	Microteaching	Microteaching / Midterm Evals	
2	Grading	Classroom Management	
3	Midterm Evaluations	Teaching Videos	

- (2015-2016) GTAs given five-point Likert survey to evaluate usefulness of every course topic/activity

Final survey top 3 (2015-2016)				
Rank	Activity	Mean ± St.Dev	Activity	Mean ± St.Dev
1	Microteaching	4.38 ± 1.07	Microteaching	4.32 ± 0.72
2	Classroom Observations	3.79 ± 1.29	Teaching Physics	4.23 ± 0.69
3	Teaching Physics	3.76 ± 1.06	Classroom Observations	4.09 ± 1.11

- Microteaching is considered the most useful topic** consistently across all four years of GTA prep course

## ATI Pre/Post

- 16 five-point Likert-scale items
- 2 categories, 8 items each:
  - teacher-centered
  - student-centered

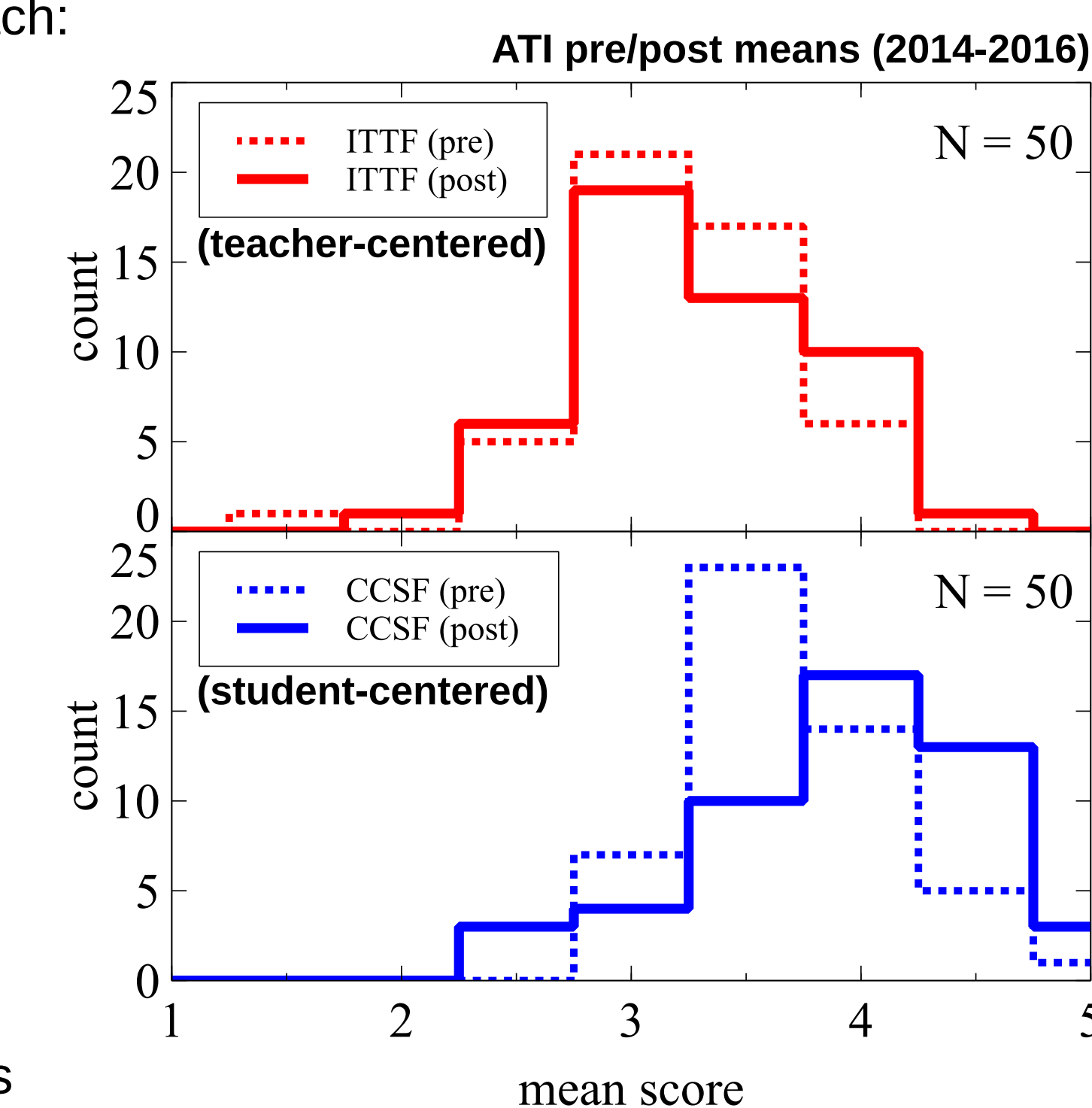
- Calculate means in each category for every GTA, pre/post

- No difference in distributions of pre/post means for teacher-centered approaches

- Statistical difference in distributions of pre/post student-centered means (2-sample K-S test,  $p=0.032$ )

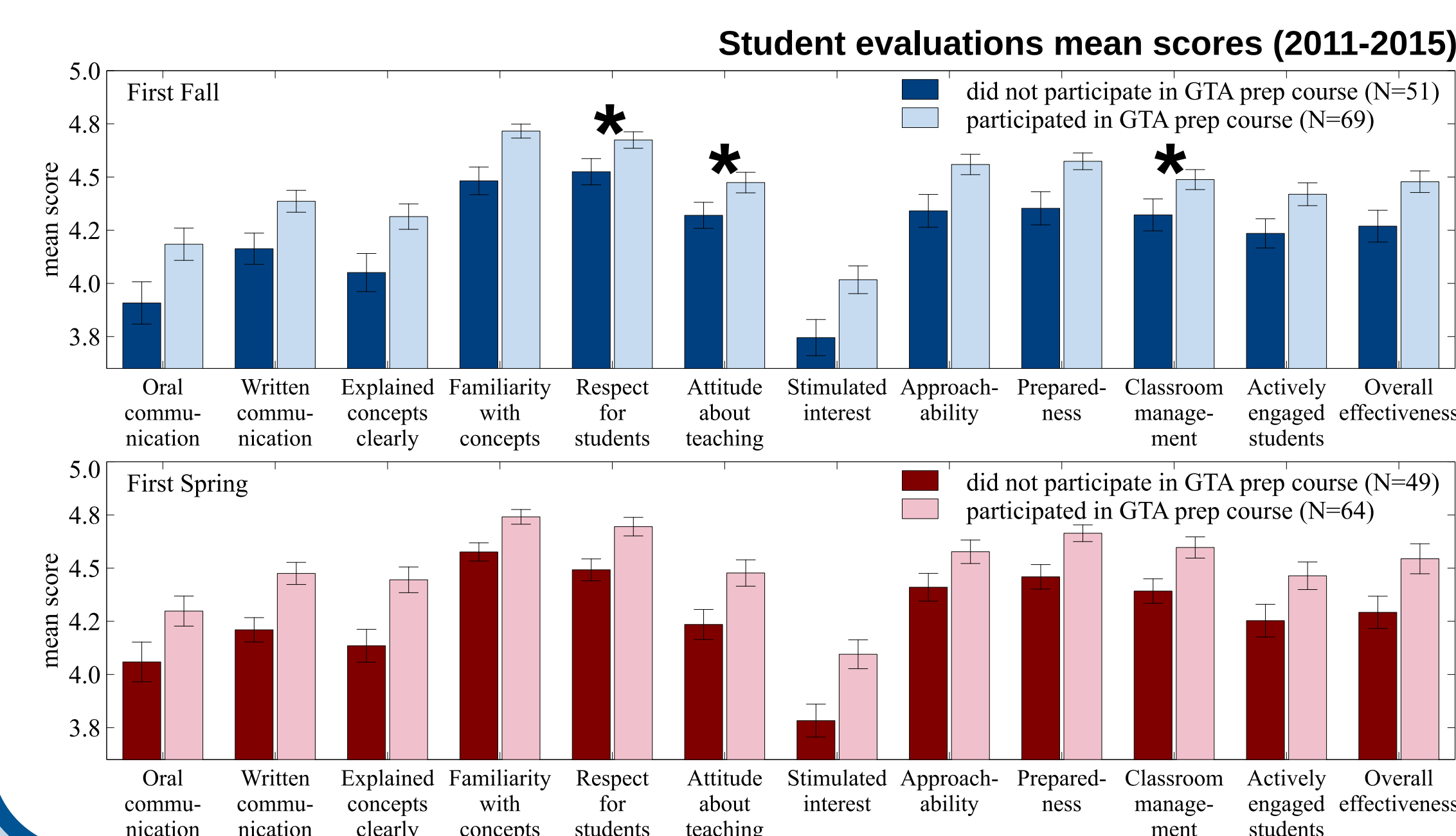
- Statistically significant improvement in student-centered grand mean, from 3.52 to 3.72 (Wilcoxon signed-ranks test,  $p=0.023$ )

- GTAs' approaches to teaching are more student-centered after one semester of GTA preparation and teaching experience



## Student Evaluations

- 12 five-point Likert-scale items
- Available data for first-time GTAs:
  - before GTA prep started (2011-2012)
  - participated in GTA prep (2013-2015)
- First-time GTAs who participated in GTA prep received higher evaluation scores across the board**
- Analysis (Mann-Whitney tests):
  - First Fall:** statistically significant improvement ( $p < 0.05$ ) in all but 3 categories (labeled \*)
  - First Spring:** statistically significant improvement ( $p < 0.05$ ) in all categories



## Discussion

Our GTA Preparation course is well-liked by the grad students who have participated in it, and is effective at improving GTAs' teaching skills.

- GTAs find the course **useful**
- The course effectively **improves GTAs' self-confidence** in their teaching abilities
- The course effectively **increases GTAs' student-centered teaching practices**
- GTAs generally give high ratings to course topics, but find **practical activities the most useful**, such as Microteaching, Midterm Evaluations, and Classroom Observations
- Students consistently give **higher end-of-semester ratings** to first-time GTAs who participate in the course than GTAs who received no formal GTA preparation
- Grad students who participate in the course are **more effective first-time GTAs** than grad students who predate the course, though we must keep in mind the subjectivity of student evaluations [7-10]

### References

- G.E. Gardner and M.G. Jones, Science Education 20(2), 31 (2011)
- G. Gibbs and M. Coffey, Active Learning in Higher Education 5(1), 87 (2004)
- J.S. Boman, Canadian Journal of Higher Education, 43(1), 100 (2013)
- N.G. Holmes, et al., The Physics Teacher, 51(4), 218 (2013)
- D.F. Feldon, et al., Science 333(6), 1037 (2011)
- K. Trigwell and M. Prosser, Educational Psychology Review 16(4), 409 (2004)
- R. Moore, The American Biology Teacher, 52(5), 260 (1990)
- H.W. Marsh and L.A. Roche, American Psychologist, 52(11), 1187 (1997)
- P.J. Yunker and J.A. Yunker, Journal of Education for Business, 78(6), 313 (2003)
- C.R. Emery, T.R. Kramer and R.G. Tian, Quality Assurance in Education, 11(1), 37 (2003)