What elements of GTA development do GTAs find most useful?

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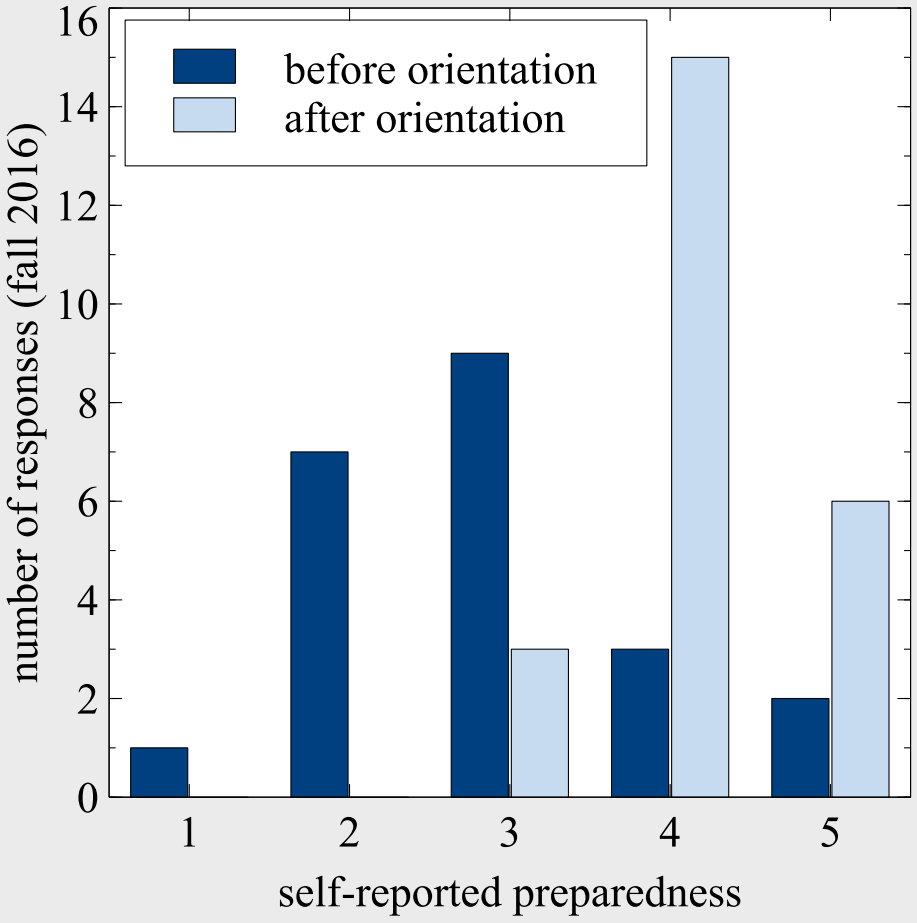
Physics GTA Preparation

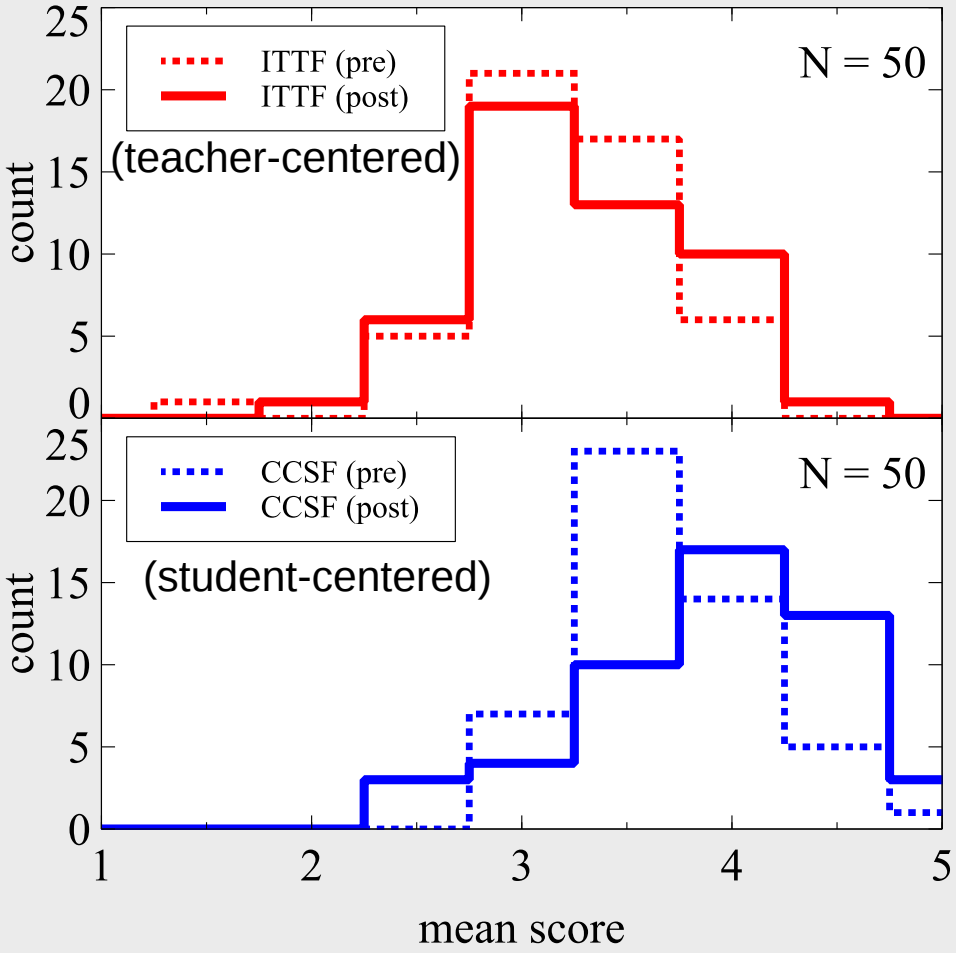
- Integration of **pedagogy**, **physics**, and **professional development**
- Established in 2013; prepared 92 grad students to date
- **Major goals:**
  - Help GTAs develop and apply learner-centered teaching practices
  - Explain physics concepts, address student preconceptions, and facilitate problem solving
  - Give/receive feedback; manage classroom dynamics
  - Identify transferable skills useful for future career

Increases GTA Self-Confidence and Learner-Centered Teaching



← "How prepared do you feel for your first GTA assignment at Georgia Tech?"

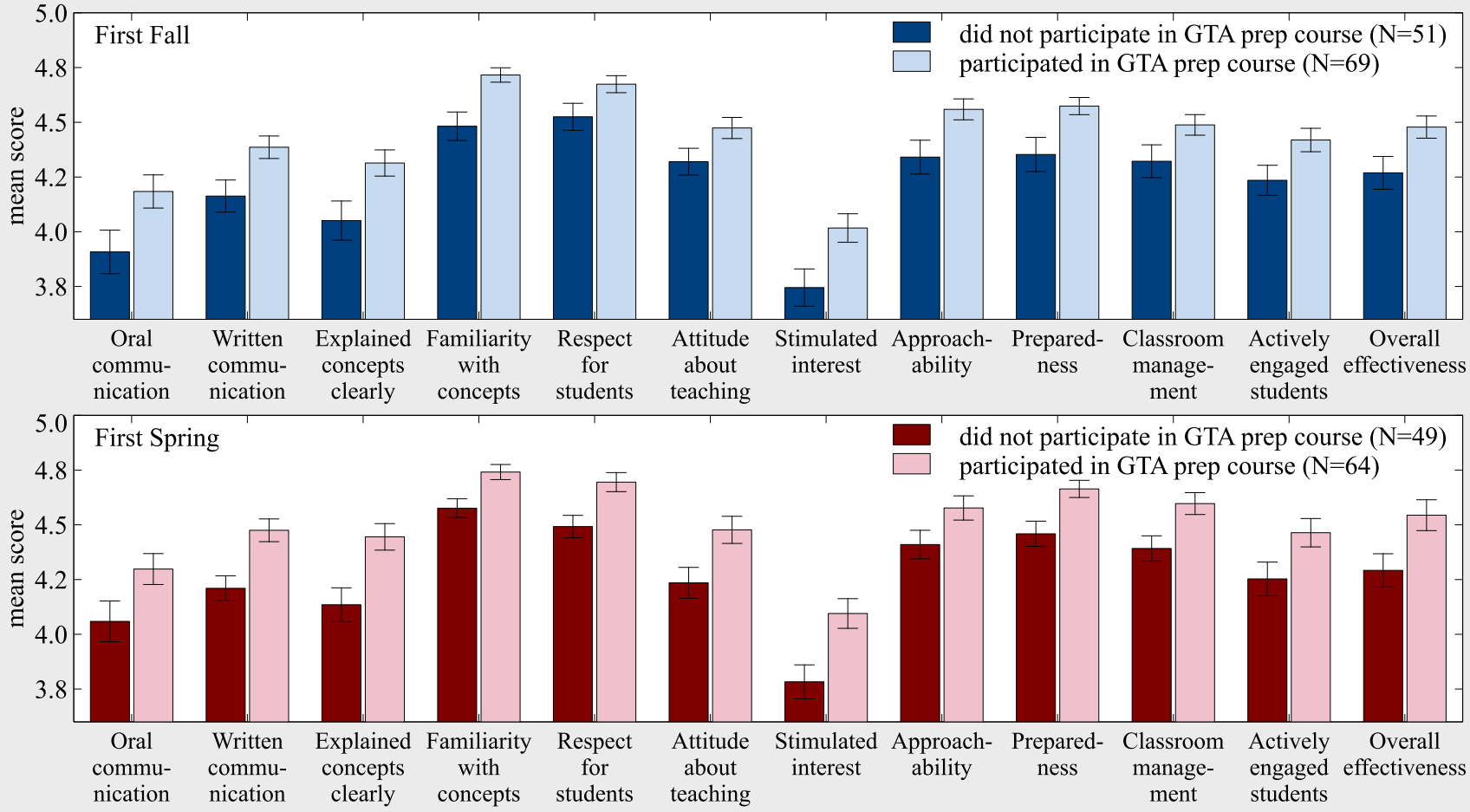
→ Approaches to Teaching Inventory (ATI)* pre/post



* K. Trigwell and M. Prosser, Educational Psychology Review 16(4), 409 (2004)

Improves Teaching Effectiveness of First-Time GTAs

- End-of-semester student evaluations
  - 2011-2012: No GTA Prep **(darker colors)**
  - 2013-2015: GTA Prep (lighter colors)



What elements do GTAs consider the most useful?

- **2013 and 2014:** GTAs asked to identify top 3 most useful course topics

Rank	2013	2014
1	Microteaching	Microteaching / Midterm Evaluations
2	Grading	Classroom Management
3	Midterm Evaluations	Teaching Videos

What elements do GTAs consider the most useful?

- **2015 and 2016:** five-point Likert survey to evaluate usefulness of topics

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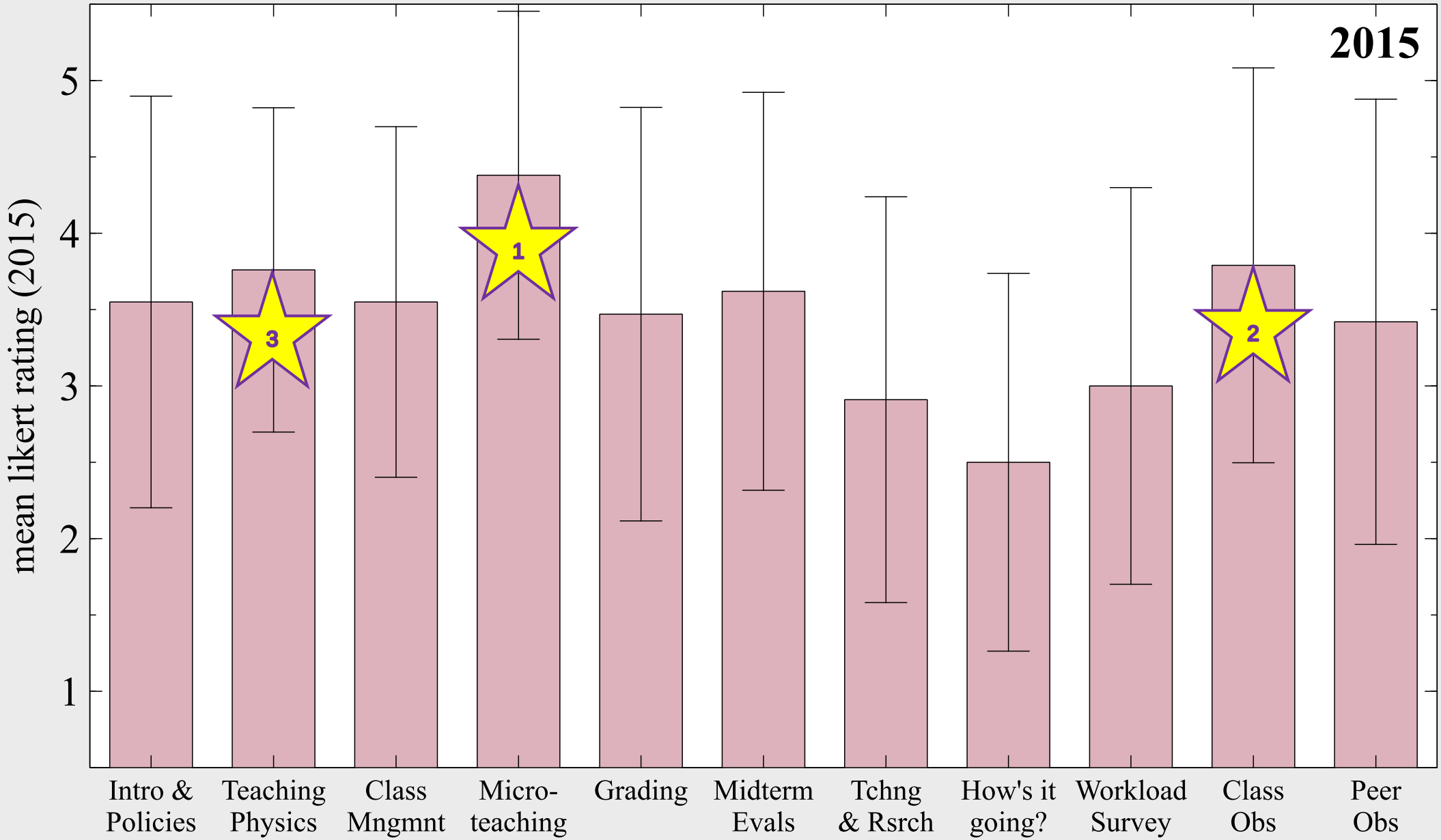

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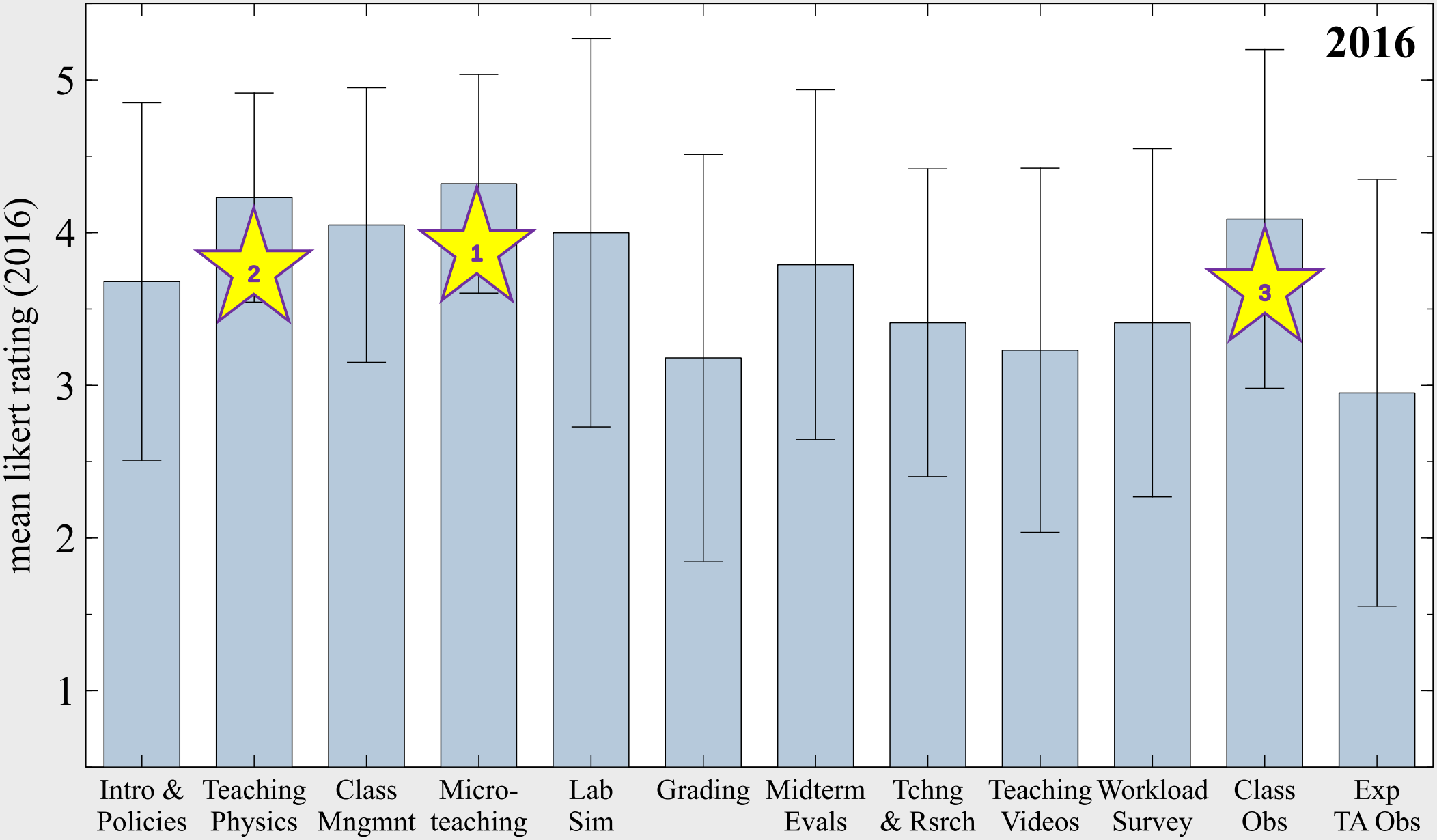

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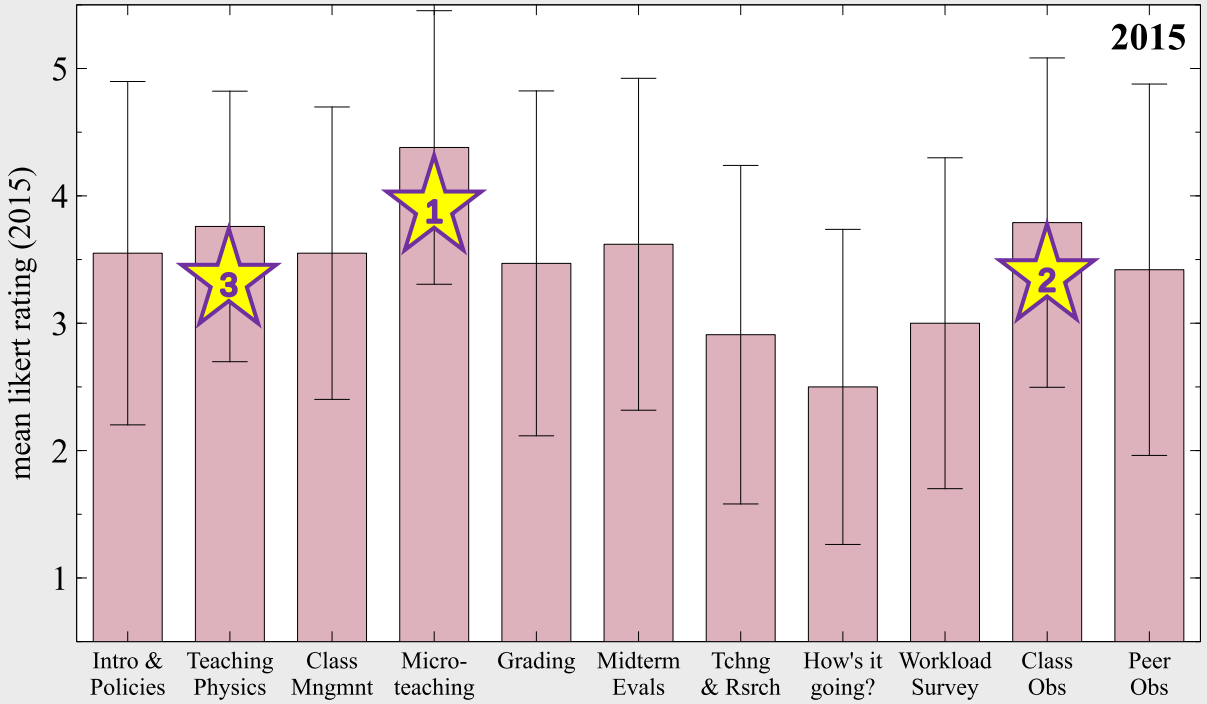
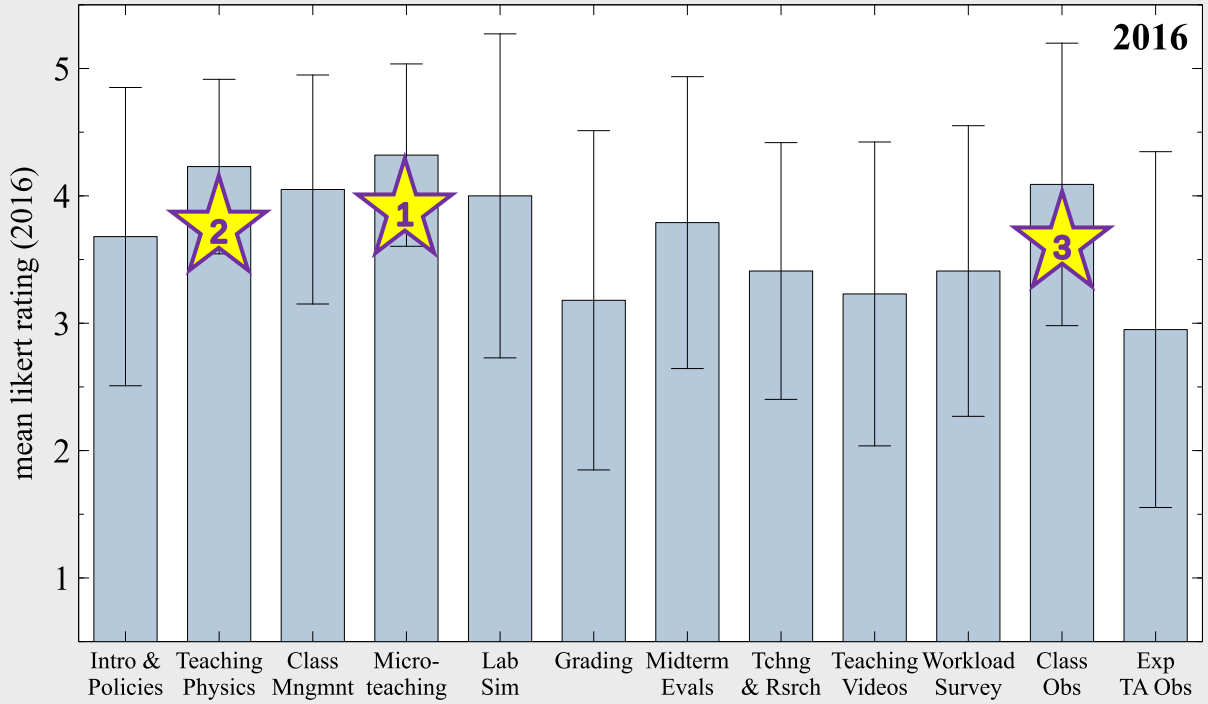
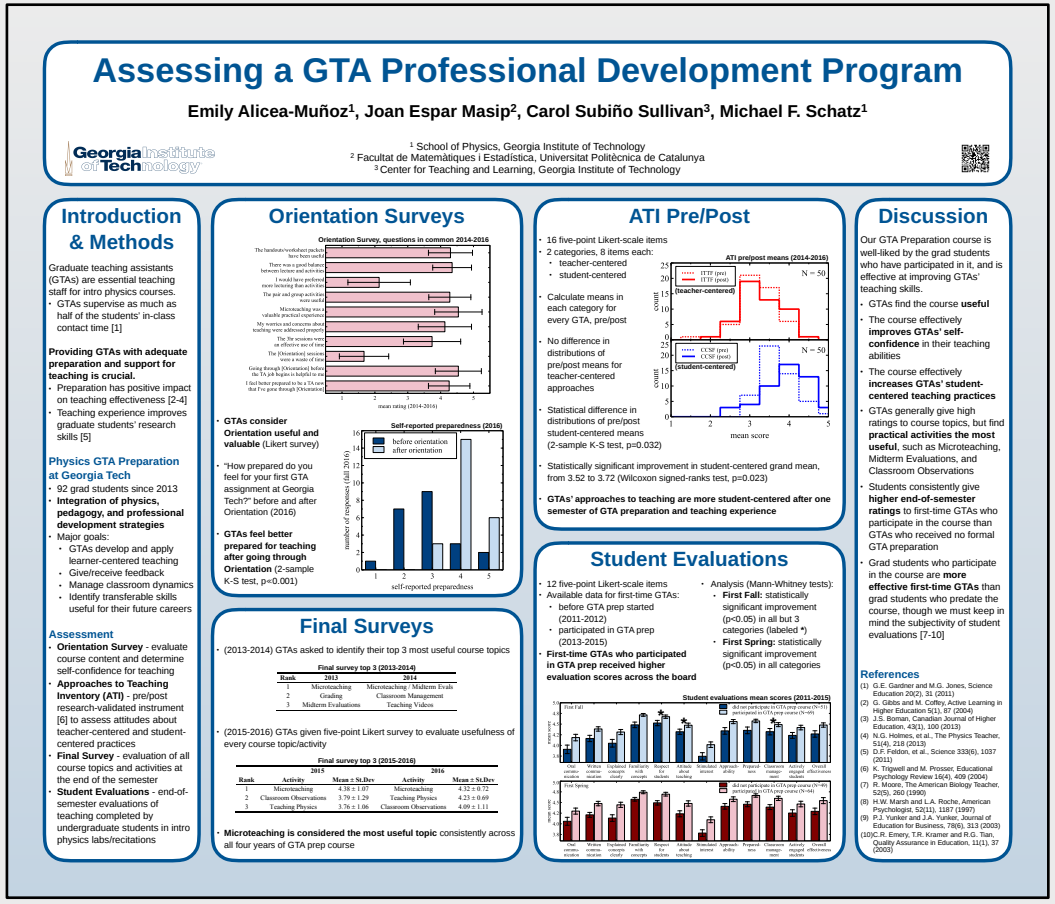




GTAs Prefer Practical Activities

- **Microteaching** consistently rated most useful course topic
  - Also Midterm Evaluations, Classroom Observations
- More information: **PERC Poster**
  - **Assessing a GTA Professional Development Program**
  - Thursday 8am, Poster ID: **C1**



Assessing a GTA Professional Development Program

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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	2015 Activity	2015 Mean ± St.Dev	2016 Activity	2016 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

(1) G.E. Gardner and M.G. Jones, Science Education 20(2), 31 (2011)
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(3) J.S. Boman, Canadian Journal of Higher Education, 43(1), 100 (2013)
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