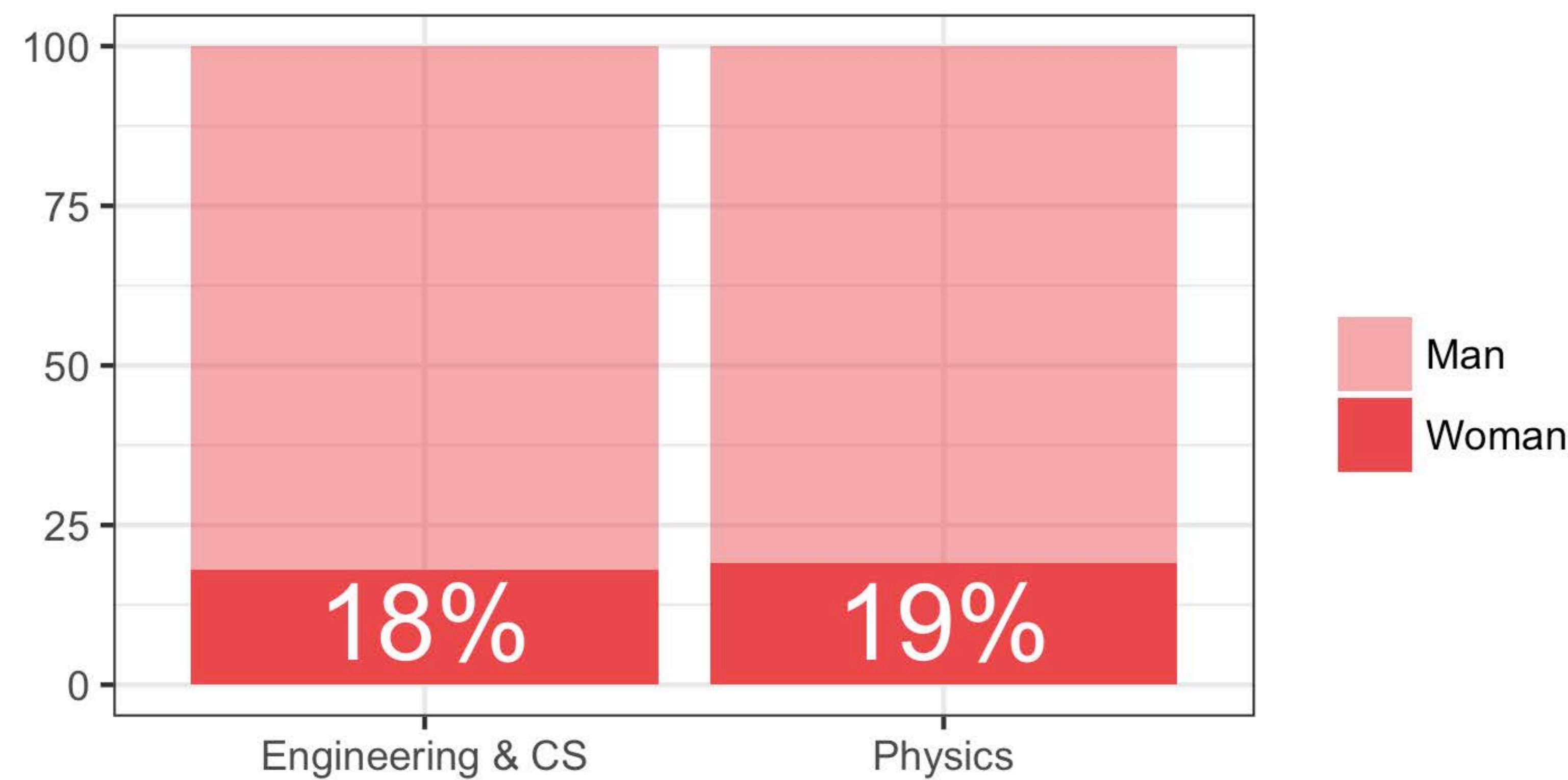


Focusing on Retention and Active Learning Pedagogies

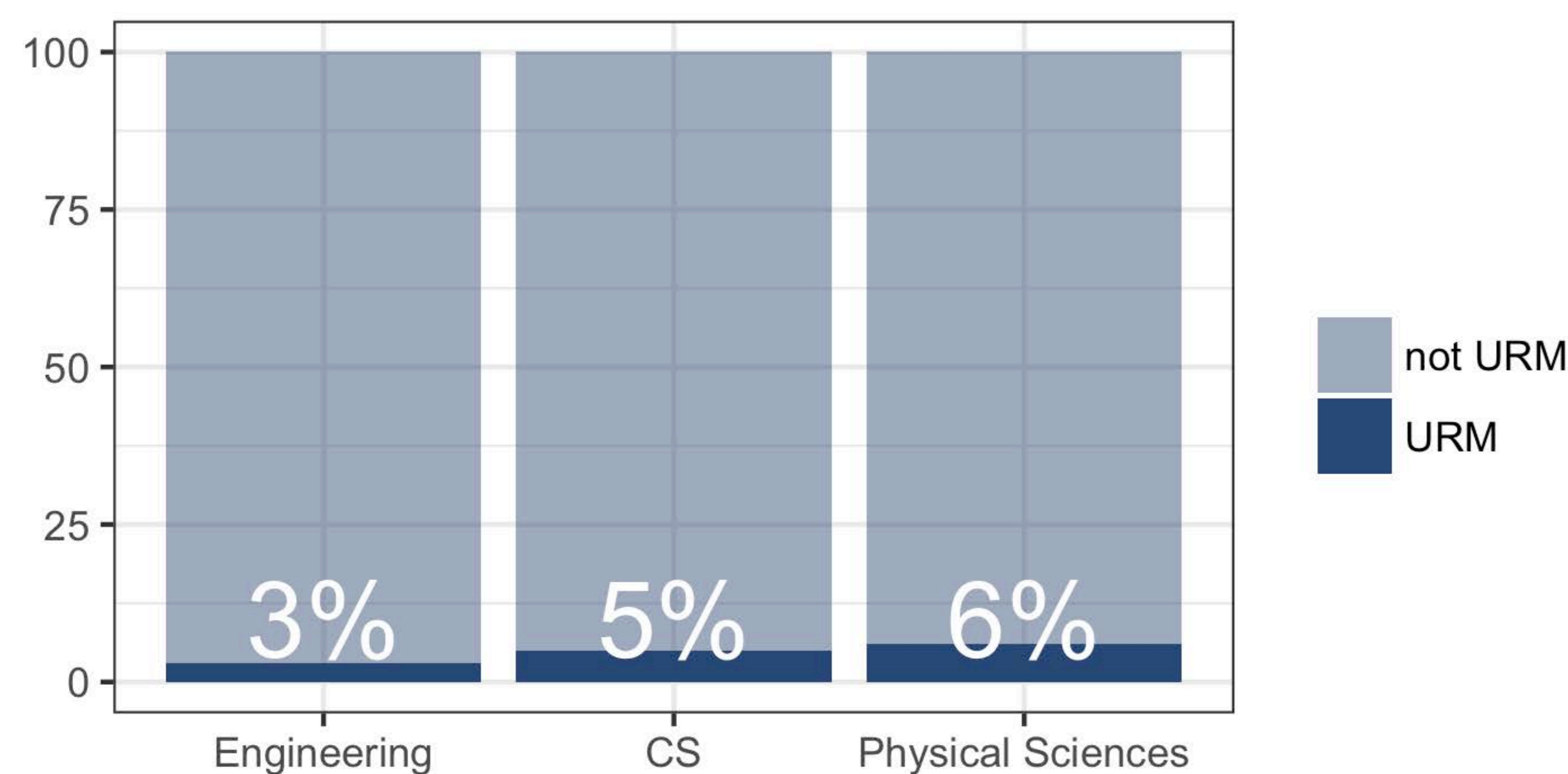
How does **active learning** impact students' **self-efficacy** in **introductory STEM courses**?

Motivation

Percentage of Degrees Awarded to Women in 2013



Percentage of Degrees Awarded to Underrepresented Minority Women in 2013



Goals

- Contribute to the current efforts to understand heterogeneity in the classroom and to explain why women and minorities are leaving STEM fields.
- Have an exploratory and explanatory approach to this question. Contribute to the solution of this issue by proposing methods that can be implemented in introductory courses and that can verifiably increase retention rates.

Methodology

& what we accomplished so far

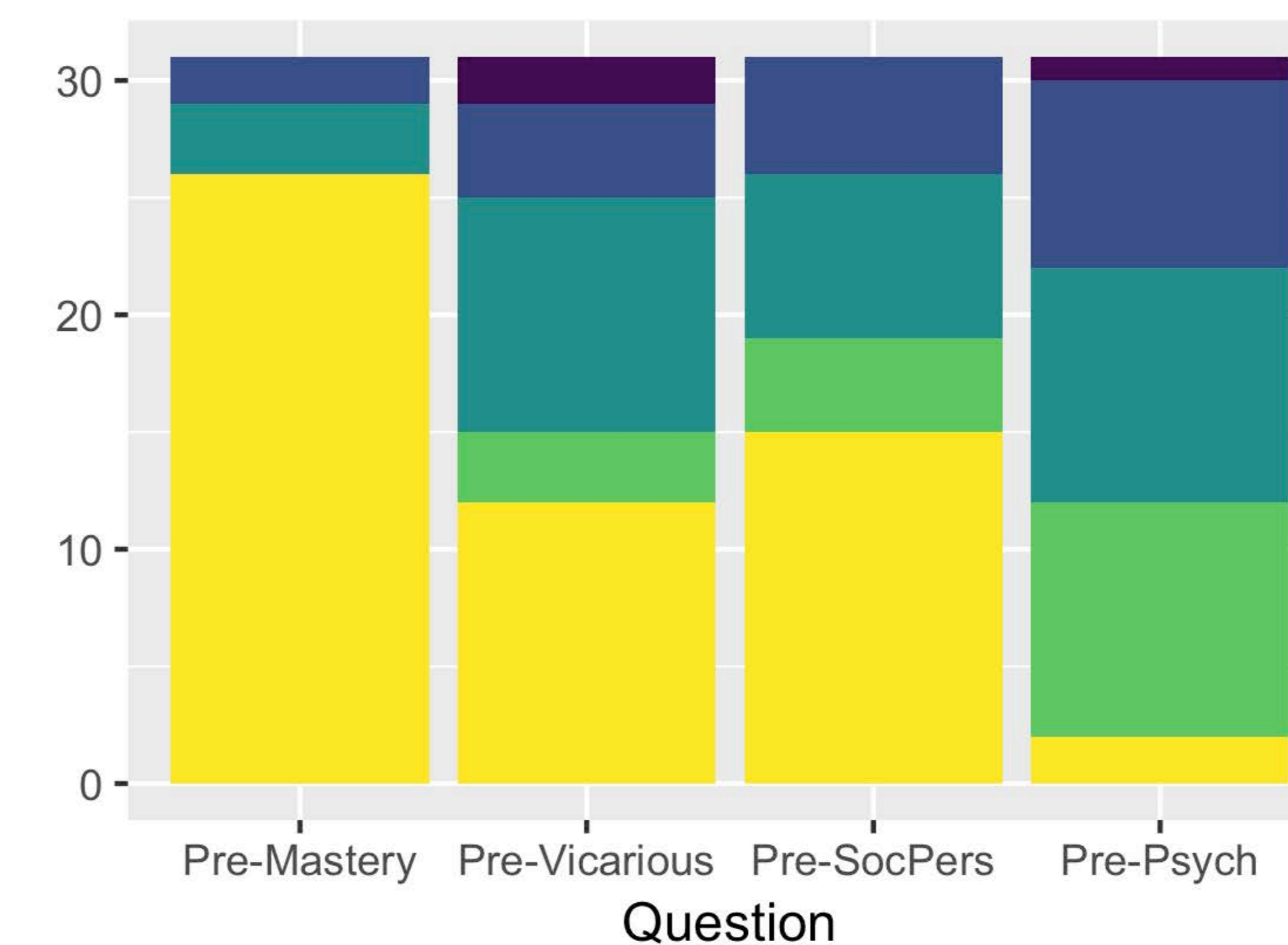
- Conduct randomized controlled experiments in three subjects: Statistics, Economics, Engineering (disciplines of team leaders and members) taught in two ways (passive: lecture only, active: with clicker questions).
 - Use a screening survey to collect information on volunteers (Duke students) who wish to participate in the experimental sessions.
 - Randomly assign these subjects, after blocking for sex, to one of six experimental sessions (active + passive Statistics, active + passive Economics, active + passive Engineering).
- Develop and test-out mini-lessons to be taught in the experimental sessions.
- Develop pre/post surveys to be conducted during these sessions measuring self efficacy:
 - Self-reported
 - On four axes of the social cognitive theory:
 - mastery of subject,
 - vicarious learning,
 - learning environment, and
 - emotion towards subject
- Run the experimental sessions and collect data.
- Analyze the data, looking for differences in student self-efficacy between active and passive learning sessions as well as between men and women.

Preliminary results

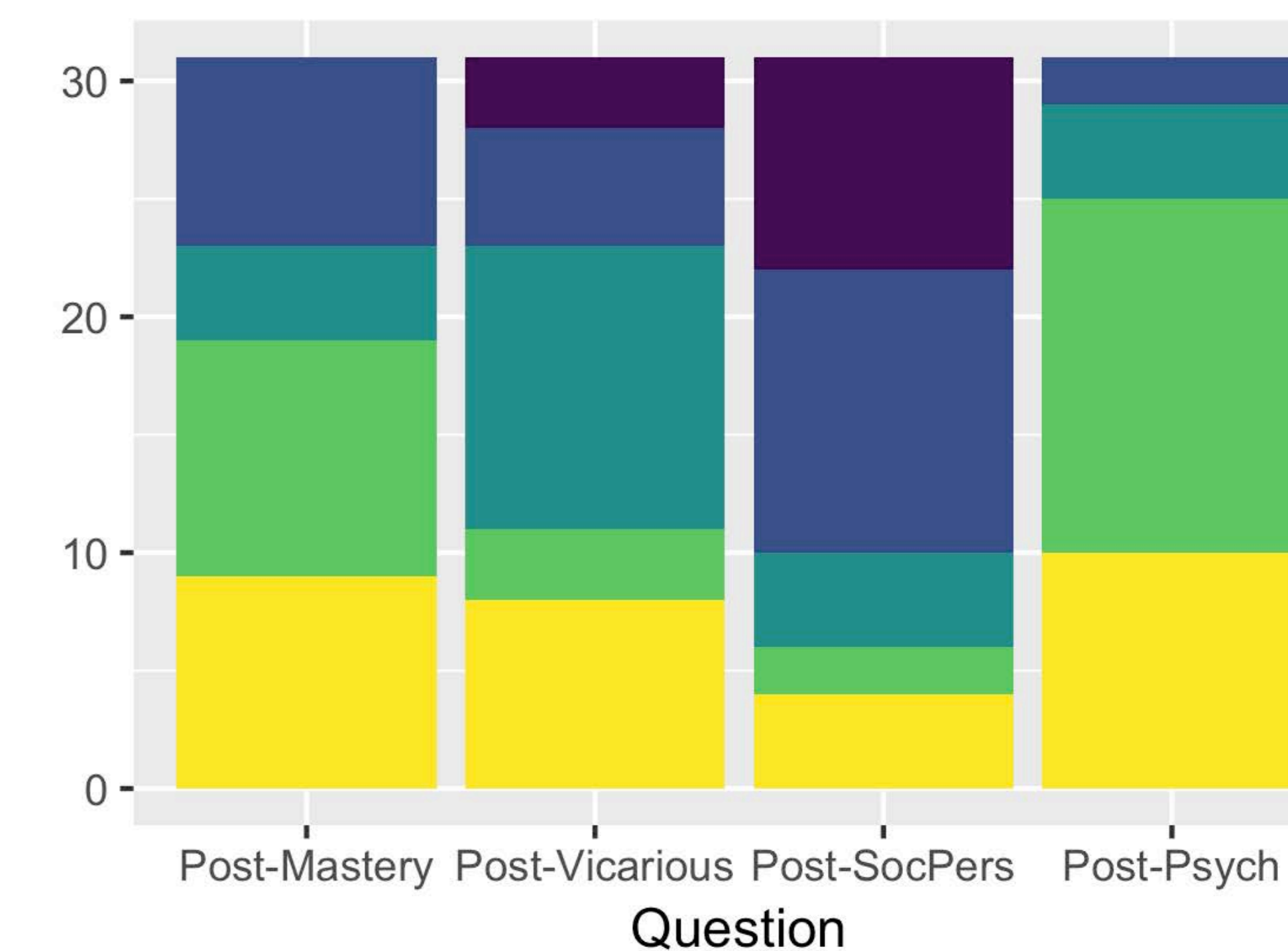
- Mastery: "I have a high level of mastery in [subject]."
- Vicarious: "I have seen other students, like me, succeed in [subject]."
- SocPers: "I felt supported in learning [subject] previously / in this environment."
- Psych: "I feel anxious about learning [subject]."



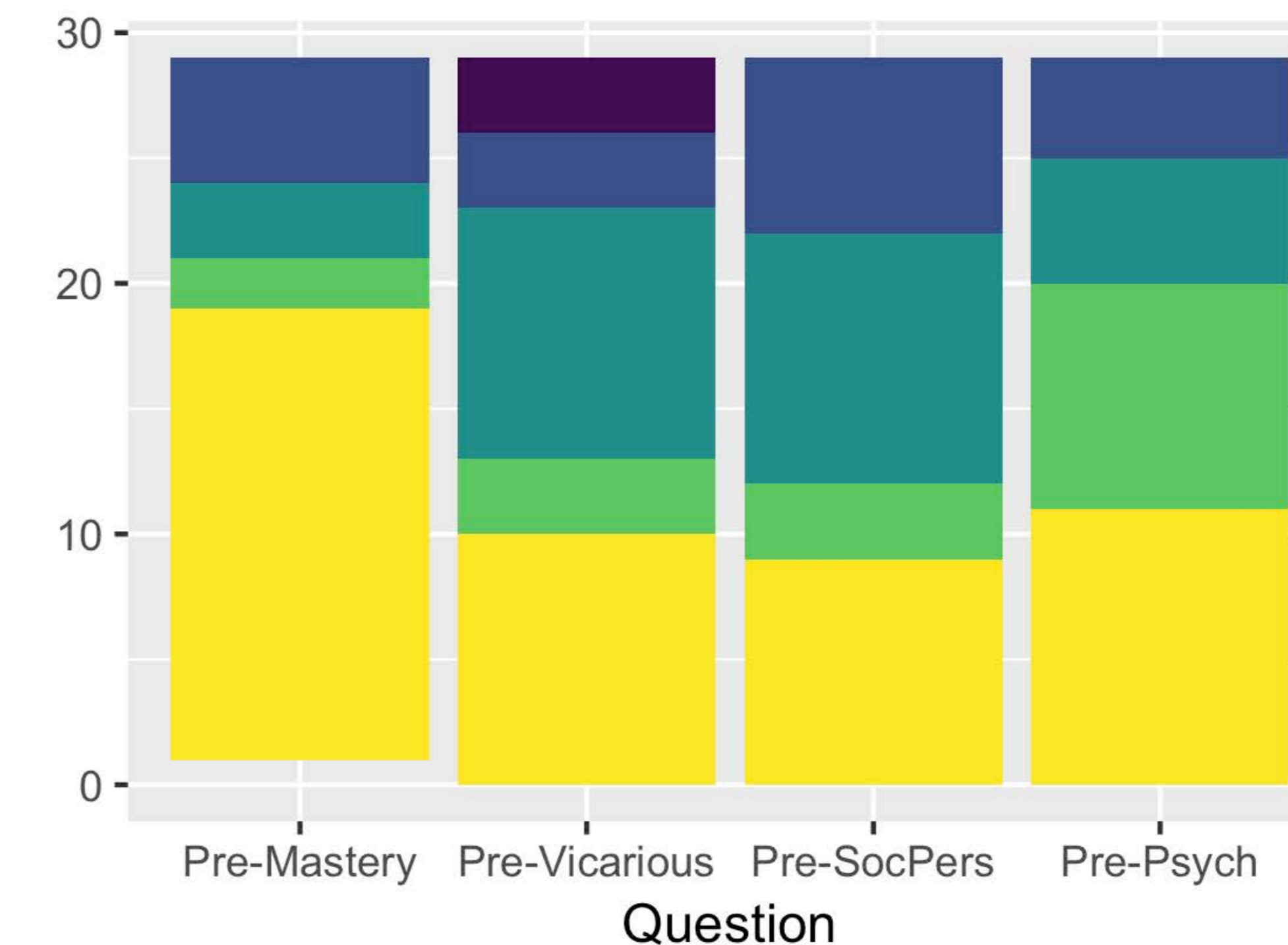
Passive Female - Pre



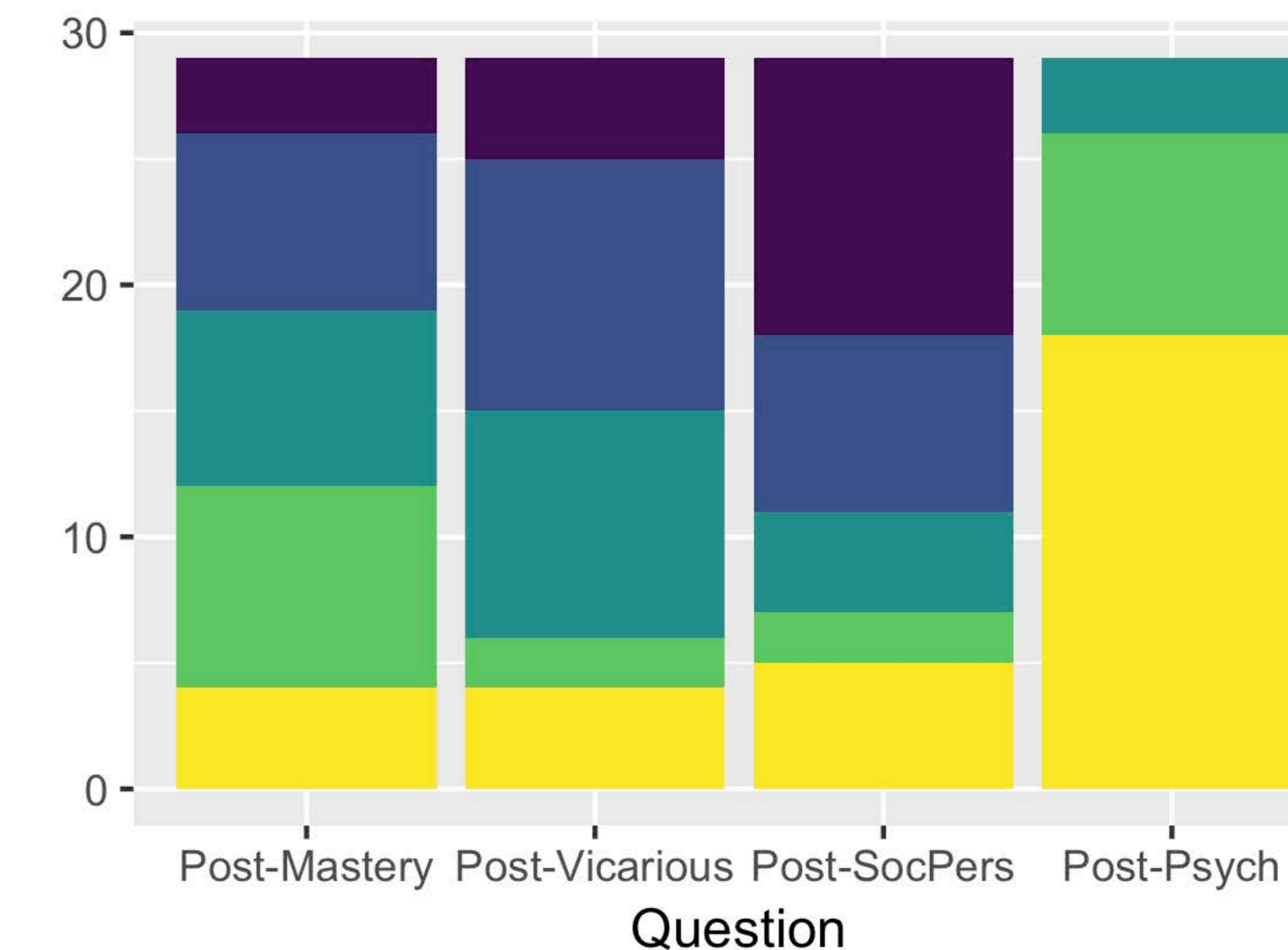
Passive Female - Post



Active Female - Pre



Active Female - Post



Next steps

- Complete data analysis and write up results.
- Evaluate the research methodology based on experience with recruiting for, running, and analyzing the data from the experimental sessions.
- Next year: Apply same (or revised) methodology to investigate a different active learning tool.

STEM FOR ALL 2016 - 2017 Team:

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Find out more at bit.ly/stem_for_all