Gender Differences in Class Participation in Core Computer Science Classes

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Motivation

Now, I wouldn't be a good instructor if I didn't try to push you further, especially because I think you have the skills. So I would like to mention that **the only reason you're not ranked 1st in the class is because the top of the class was one of the most active students on Piazza and ended up getting more extra credit than you did for participation**. The reason that I'm bringing this up is that for some reason, this quarter more than others, it struck me that Piazza was so male dominant and I'd like to gather some insight about this.

I extracted some stats out of curiosity, and I found some interesting observations. **When female students participate, they often avoid writing their answers inside the "answer" box, and prefer the followup discussions down below**. According to the stats, you are actually the perfect example of that. You're the 1st female contributor on Piazza, yet ranked on 20th overall; and **on all of your contributions, only 16% are actual answers**. On the other hand, **some of the top male contributors made less contributions than you overall, but up 60% of their contributions were answers**, which got them more points.

Perspective
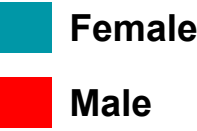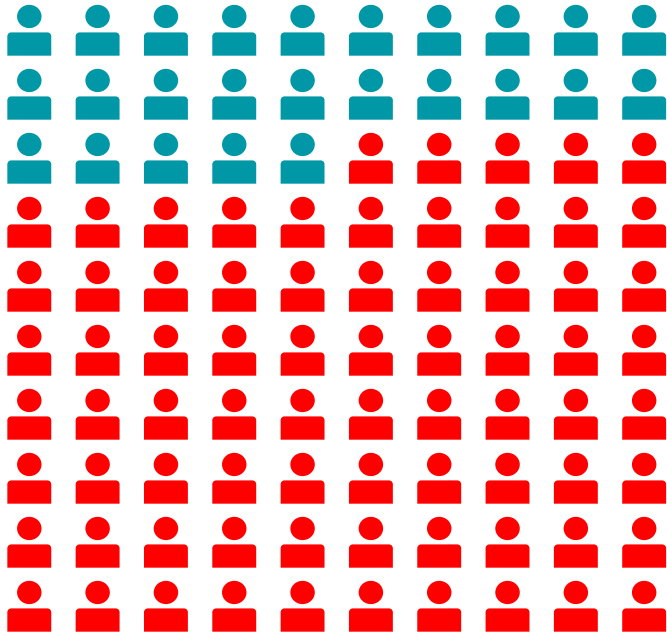
Female

Male

Class Forum
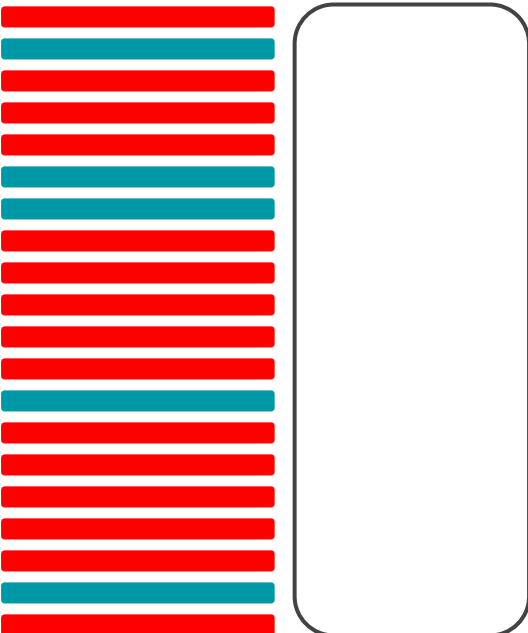
Methodology

Classes

CS3 - Data Structures and Algorithms
- 2 quarters
- 341 students
- 76.83% male
- 23.17% female

CSOS - Operating Systems
- 8 quarters
- 1,519 students
- 75.84% male
- 24.16% female

Participation Scoring

Lecture
- Asking and answering questions in class

Forum
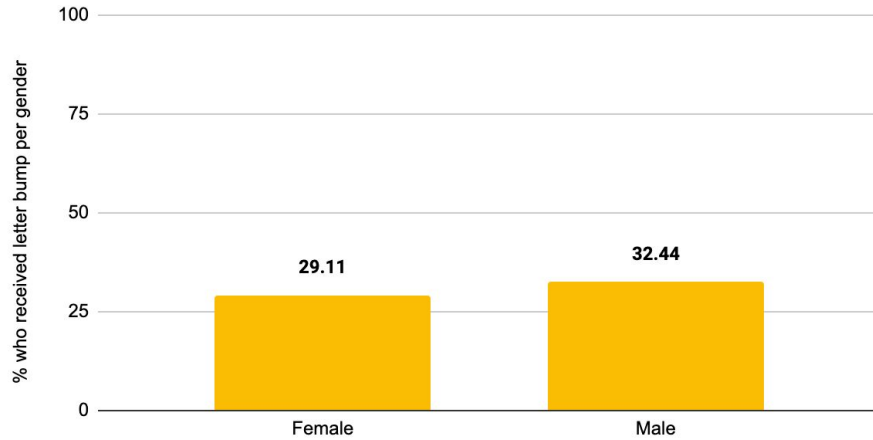- Posting questions, answers, comments on online class forum

Survey
- Completing class evaluations (official UCD course evaluation, professor-created surveys)
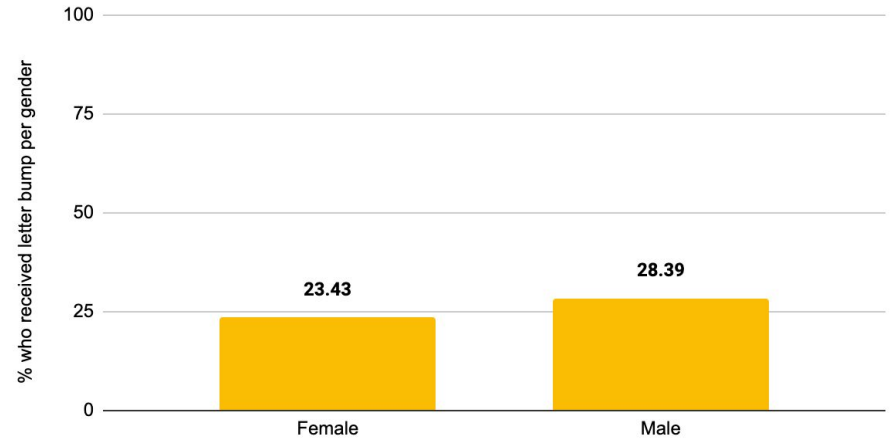
Letter Bumps

Letter Bumps by Gender
CS3

% who received letter bump per gender

100
75
50
25
0

29.11 — Female
32.44 — Male

(z = -0.56, *p* = .575)

Letter Bumps by Gender
CSOS

% who received letter bump per gender

100
75
50
25
0

23.43 — Female
28.39 — Male

(z = -1.86, *p* = .063)

Overall Participation
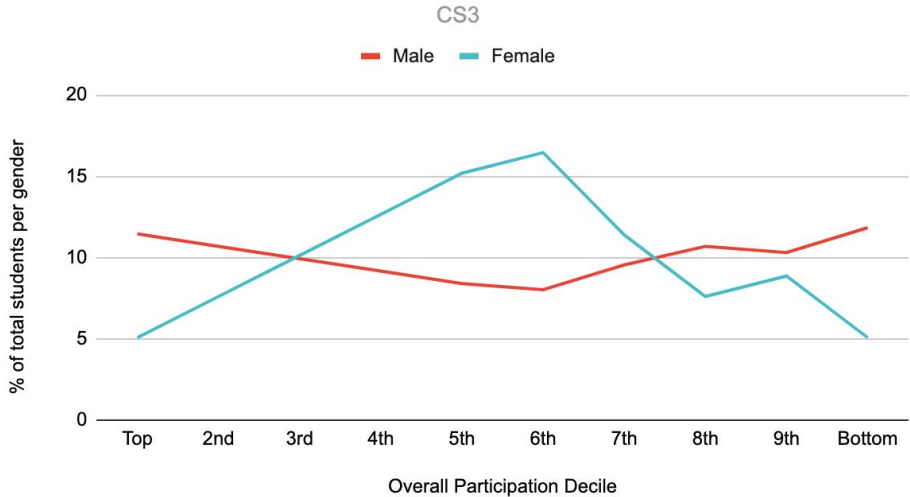
Decile Distribution of Overall Participation Scorers
CS3

Male — Female

% of total students per gender

Overall Participation Decile

Decile Distribution of Overall Participation Scorers
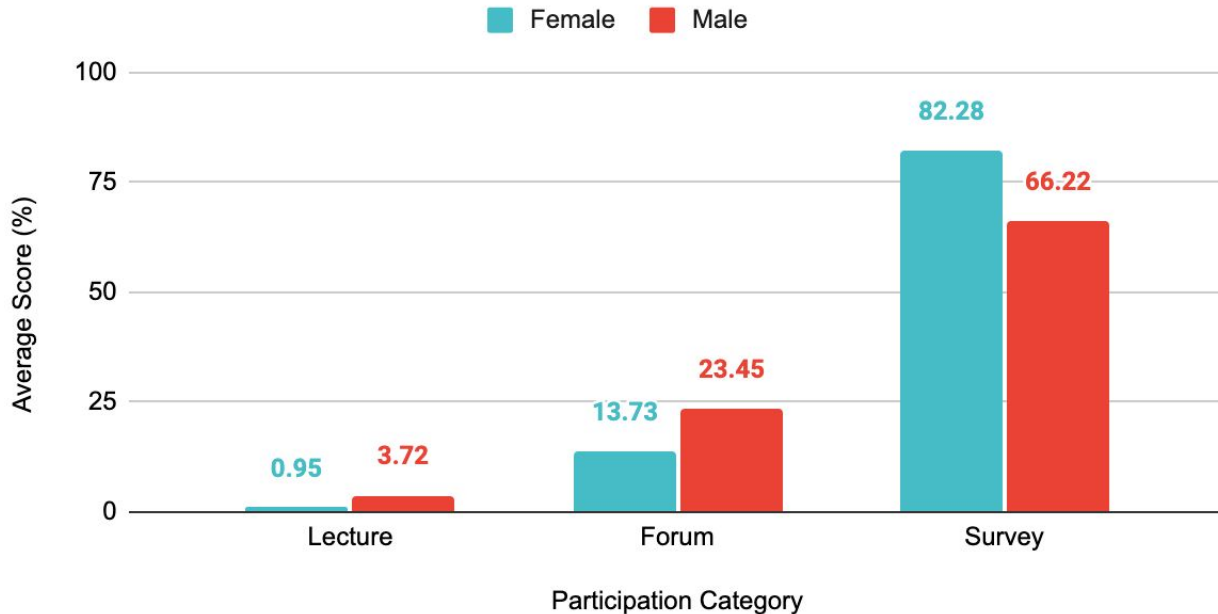CSOS

Male — Female

% of total students per gender

Overall Participation Decile
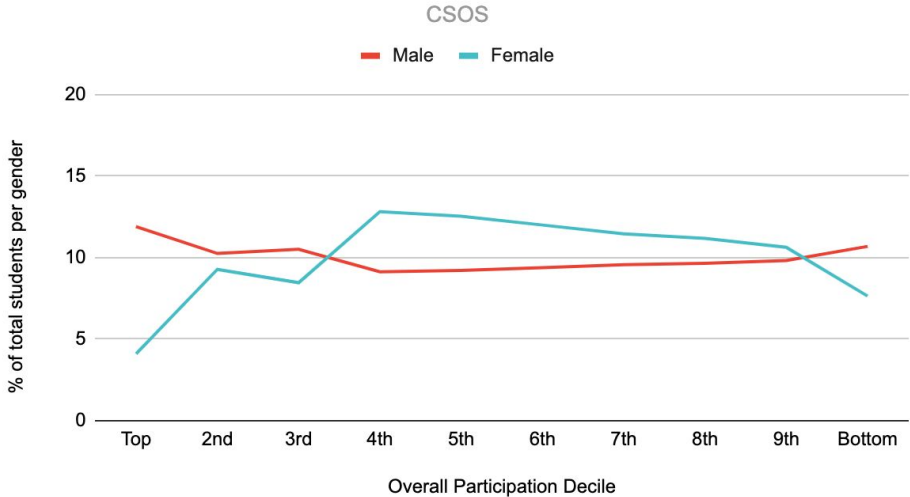
Category Averages

Gender vs Participation Scores
CS3

Lecture
Male average *3.92* times female average
($t_{(339)}$ = 2.24, *p* = .026)
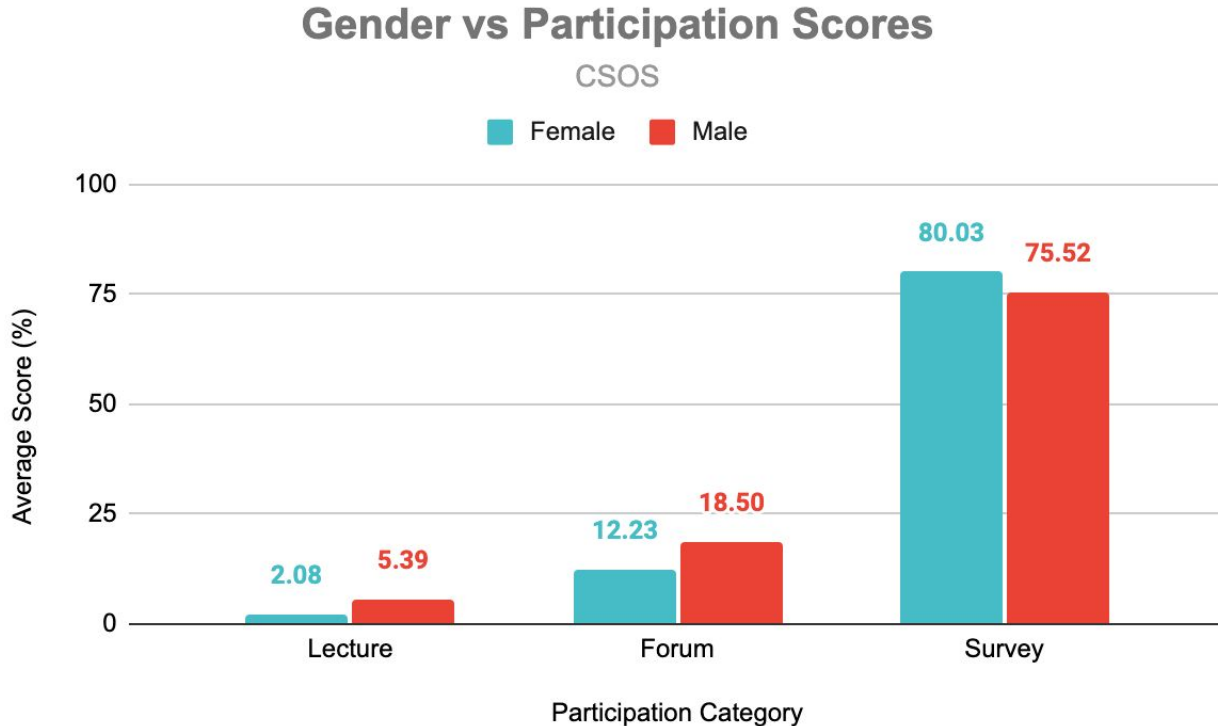
Forum
Male average *1.71* times female average
($t_{(339)}$ = 3.17, *p* = .002)

Survey
Female average *1.24* times male average
($t_{(339)}$ = -3.74, *p* < .001)

Category Averages

Gender vs Participation Scores

CSOS

Female   Male

Lecture
Male average *2.59* times female average
($t_{(1130)}$ = 3.57, *p* < .001)

Forum
Male average *1.51* times female average
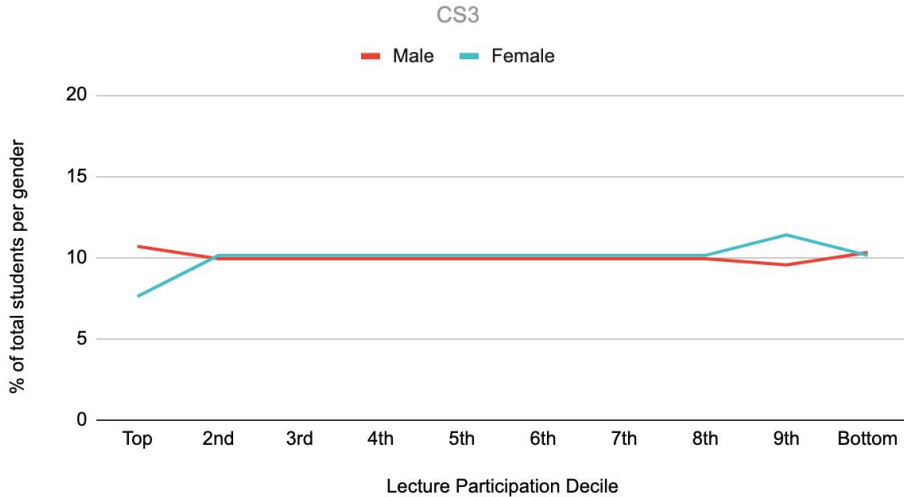($t_{(1517)}$ = 4.92, *p* < .001)

Survey
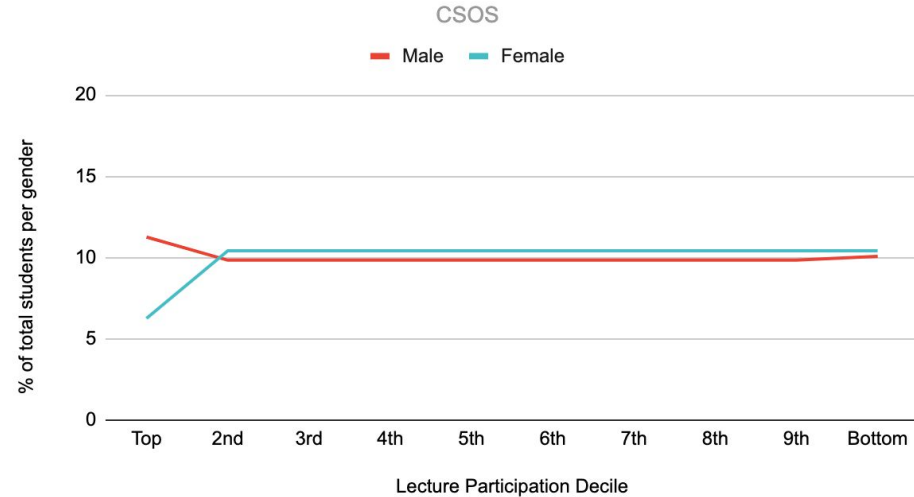Female average *1.06* times male average
($t_{(1517)}$ = -2.41, *p* = .016)

Lecture Participation

Decile Distribution of Lecture Participation Scorers
CS3

— Male   — Female

only 5.57% of students participated

Decile Distribution of Lecture Participation Scorers
CSOS

— Male   — Female

only 8.30% of students participated

Forum Participation
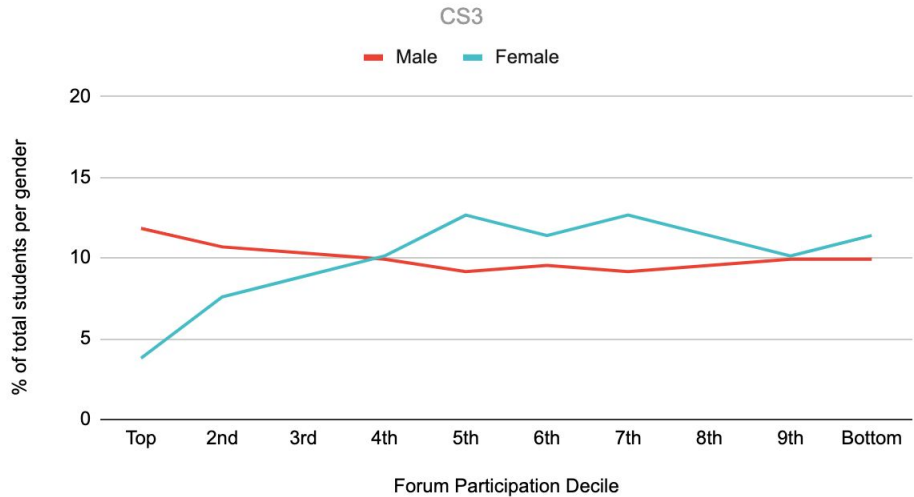
Decile Distribution of Forum Participation Scorers
CS3

Male   Female

% of total students per gender

Forum Participation Decile

75.07% of students participated

Decile Distribution of Forum Participation Scorers
CSOS

Male   Female

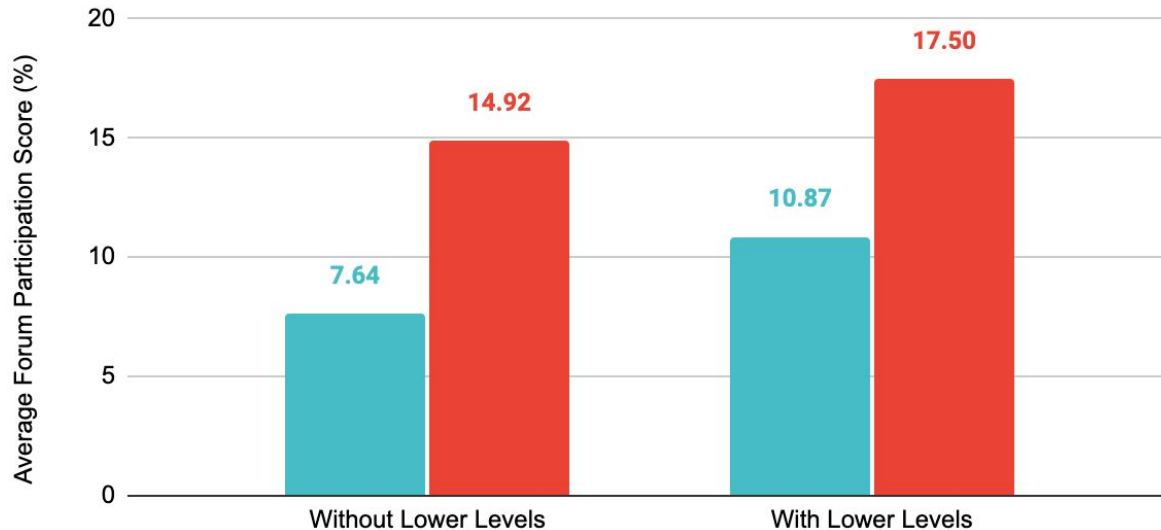% of total students per gender

Forum Participation Decile
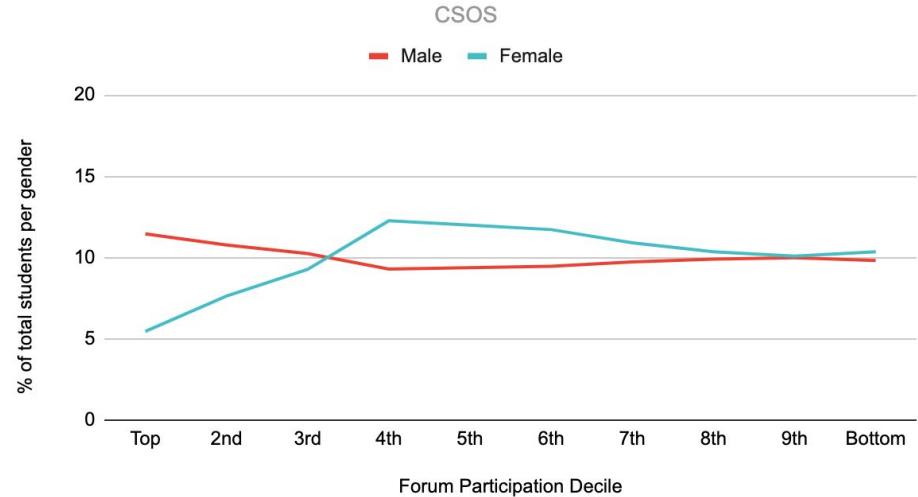
62.48% of students participated

Rewarding Lower Levels of Forum Participation

Gender vs Benefit of Added Forum Levels

CSOS

Without Lower Levels
Male average *1.95* times female average
($t_{(969)}$ = 5.00, *p* < .001)
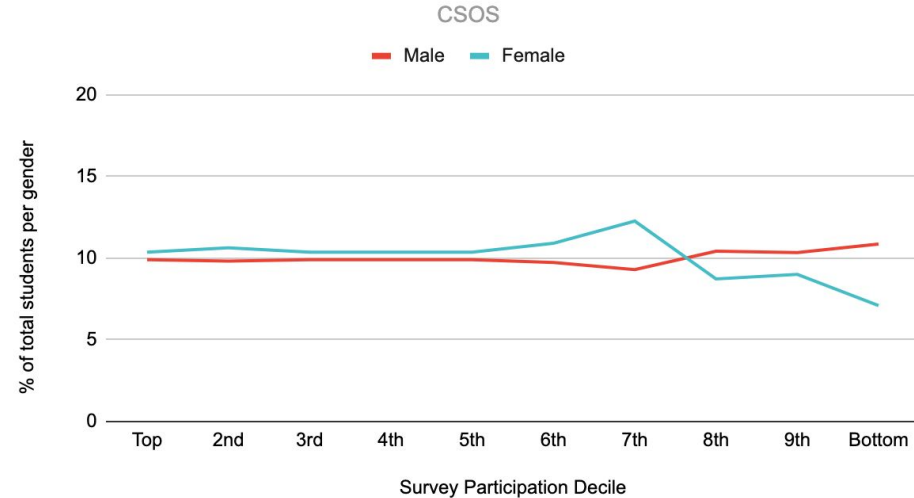
With Lower Levels
Male average *1.61* times female average
($t_{(969)}$ = 4.84, *p* < .001)

Survey Participation

Decile Distribution of Survey Participation Scorers
CS3

■ Male ■ Female

% of total students per gender

Survey Participation Decile

Decile Distribution of Survey Participation Scorers
CSOS

■ Male ■ Female

% of total students per gender

Survey Participation Decile

12
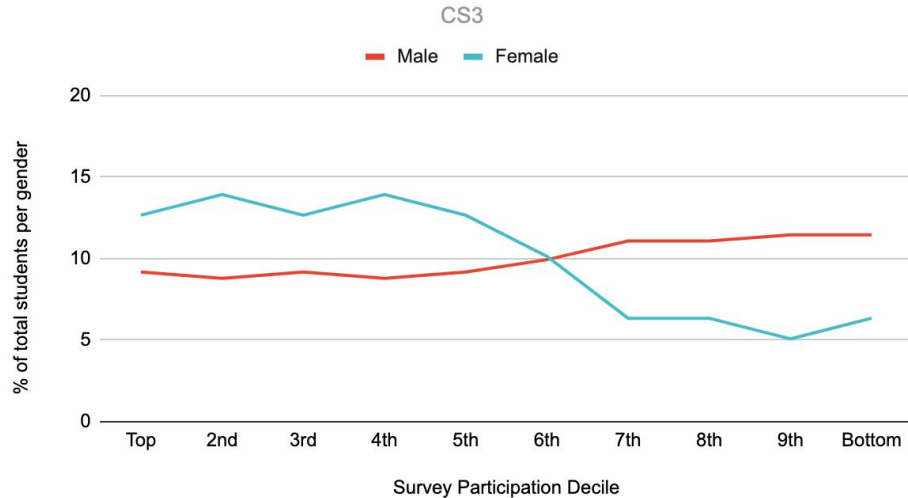
Takeaways - Overall Observations

- Males dominate most public forms of participation
  - **Top participation scorers can shape the perception of the class**

- Males and females benefit from participation at same rate

- Higher female participation in less public settings

- Similar trends in lower and upper division course

Takeaways - Mitigations

- Instructors should vary their measures of participation

- **Rewarding survey completion and lower levels of forum participation reduces gap between male and female participation scores**

- Further research on what drives differences in participation between students of different backgrounds

Future Work

1. Which student traits are a predictor of class participation habits, and why do these students behave this way?

2. **What do students believe should count as participation in CS classes?**