Gender Differences in Class Participation in Core Computer Science Classes

Madison Brigham
Joël Porquet-Lupine
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

(z = -0.56, p = .575)

(z = -1.86, p = .063)
Overall Participation

Decile Distribution of Overall Participation Scorers

CS3

Male  Female

Decile Distribution of Overall Participation Scorers

CSOS

Male  Female

Overall Participation Decile
Category Averages

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

**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

only 5.57% of students participated

only 8.30% of students participated
Forum Participation

75.07% of students participated

62.48% of students participated
Rewarding Lower Levels of Forum Participation

Gender vs Benefit of Added Forum Levels

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

<table>
<thead>
<tr>
<th>Decile</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>2nd</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>3rd</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>4th</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>5th</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>6th</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7th</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>8th</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9th</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Bottom</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Decile Distribution of Survey Participation Scorers

CSOS

<table>
<thead>
<tr>
<th>Decile</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>2nd</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>3rd</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>4th</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>5th</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>6th</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7th</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8th</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9th</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bottom</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Survey Participation Decile
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?