Gender, Context, and the Force Concept Inventory: Further Studies

- Laura McCullough,
- Physics Department
- University of Wisconsin-Stout

Gender, Context and the FCI

- There is a gender gap on the FCI in which men on average outperform women

- One possible reason could be due to the typically male contexts within the FCI: rockets, hockey, cannonballs, etc.

- How might changing the context of the questions to more typically female contexts affect student responses?

- (Andy Elby & Michael Wittmann EE07; Noah Finkelstein, PERC)

Trial testing

- Gave both versions to students:
  - University of Wisconsin-Stout—calculus-based
  - Iowa State University—algebra-based
  - Cal State University-Long Beach—algebra-based
- Gave Gender FCI only:
  - College Misericordia
  - Southern Illinois University-Edwardsville—calculus-based
  - Phillips Exeter Academy—conceptual physics

Gender FCI Only—Results

College Misericordia—Small Catholic college

Pretest	N	Avg. % correct
Females	11	28.1
Males	3	24.5

Phillips Exeter Academy—private high school

	N	Avg. % correct
Pretest-Females	19	28.6
Males	11	32.7
Post-test-Females	19	56.8
Males	11	67

Particular questions with large gender difference:

Females did better on: #5, 17, 26

Males did better on: #7, 10, 14, 20, 28, 30

SIUE—state university, 10,000 UG, suburban

Pretest	N	Avg. % correct
Females	16	28.7
Males	71	36.5

Particular questions with large gender difference:

Females did better on: #7

Males did better on: #2, 5, 6, 8, 10, 12, 13, 14, 16, 23, 26, 31

Comparative Results

UW-Stout—state university, 7500 students, rural

	N	Avg. % correct
Pretest-Original	24	32.7
Pretest-Gender	24	28.6
Post-test Original	24	44.4
Post-test Gender	24	42.6

Particular questions with large difference between original and gender versions:

Gender version had a higher % correct on: #1, 12

Original version had a higher % correct on : #2, 5, 10, 11, 23

Iowa State—state, 22,000 UG

Pretest	N	Avg. % correct
Original-Females		33.3
Original-Males		39
Gender-Females		34.9
Gender-Males		41.8

Particular questions with large difference between original and gender versions:

Gender version had a higher % correct on: #3, 6, 29

Original version had a higher % correct on : #4, 10, 24

Particular questions with large gender difference:

Females did better on: none

Males did better on: #6, 12, 14, 21, 27

Cal State-Long Beach (Pretest)—25,000 UG

Pretest	N	Avg. % correct
Original-Females		26.5
Original-Males		37.4
Gender-Females		26.5
Gender-Males		32.7

Particular questions with large difference between original and gender versions:

Gender version had a higher % correct on: #17

Original version had a higher % correct on : #22, 24

Particular questions with large gender difference:

Females did better on: none

Males did better on: #10, 14, 15, 28

Cal State-Long Beach (Post-test)

Post-test	N	Avg. % correct
Original-Females		36.7
Original-Males		44.1
Gender-Females		34.7
Gender-Males		44.9

Particular questions with large difference between original and gender versions:

Gender version had a higher % correct on: #12

Original version had a higher % correct on : #8, 10, 24

Particular questions with large gender difference:

Females did better on: none

Males did better on: #10, 14, 20, 23, 24, 29

Overall Results

■ Different populations, different schools, different testing conditions $\Rightarrow$ very different results!

■ A few questions show up in several different places:
12 (cannonball), 14 (bowling ball falls from plane), 24 (rocket, constant speed)

Conclusions

- Different schools, populations, testing conditions $\Rightarrow$ different results!

- No strong pattern emerges, except perhaps that the gender gap on the Original FCI is still present for many students on the Gender FCI

- Also issue of the instrument itself: how much randomness is present in normal FCI samples?

- Need more data! More comparative samples in particular

- More item analysis presented at PERC poster session Wednesday