Gender, Math, and the FCI

Laura McCullough
Physics Department
University of Wisconsin-Stout

Gender Gap

A strong gender gap exists on FCI scores in which male students out-perform female students. (Data from 8 different institutions)

	Pre % (S.E)	Post % (S.E.)	<g> (S.E.)
Women (N=780)	35.6 (.5)	57.4 (.7)	0.34 (.01)
Men (N=1997)	50.3 (.4)	68.6 (.5)	0.39 (.01)

McCullough, 2002. *Gender, Educational Reform, and Instructional Assessment: Part I*. Paper presented at the American Association of Physics Teachers Meeting in Philadelphia, PA. January 2002. Available at http://physics.uwstout.edu/staff/mccullough/physicseduc.htm.

Crouch, C. H. (2002). *Gender, Educational Reform, and Instructional Assessment: Part II*. Paper presented at the American Association of Physics Teachers Meeting in Philadelphia, PA. January 2002. Available at http://mazur-www.harvard.edu/talks/talks.taf?_function=detail&id=417

Mind the Gap

Why does this gender gap exist?

Are men better than women at physics?

Are women poorer test-takers?

Is the test biased against women?

Do women have weaker backgrounds in math and physics?

➔Let's look at math background

Methodology

- 300 non-physics students at UW-Stout
- English and sociology classes (administering this was very fun!)
- Voluntary, anonymous, ungraded testing
- Given either the original FCI or a more female-centric version (McCullough, 2001)
- After the test, asked 9 demographic questions

McCullough, 2001. *A Gender Context for the Force Concept Inventory.* Paper presented at the American Association of Physics Teachers Meeting in San Diego, CA. January 2001. Available at http://physics.uwstout.edu/staff/mccullough/physicseduc.htm

Sample —UW-Stout

312 English and sociology students

45% first-years, 32% sophomores, 13% juniors, 10% seniors

59% women, 41% men

30 different majors, only 43 undecided

64% of women and 53% of men had no previous physics experience

34% of women and 30% of men had high school physics

Math level and FCI score

Avg. % score (N)	Males/ GFCI	Females/ GFCI	Males/ FCI	Females/ FCI
Pre-algebra	22 *(6)*	31 *(4)*	34 *(6)*	20 *(12)*
Algebra	25 *(7)*	21 *(7)*	27 *(6)*	19 *(20)*
Geometry	26 *(30)*	22 *(42)*	31 *(19)*	20 *(48)*
Calculus	33 *(20)*	21 *(18)*	33 *(16)*	23 *(16)*
Diff. Eqns.	59 *(2)*	38 *(1)*	60 *(1)*	
Other	25 *(4)*	23 *(6)*	33 *(2)*	25 *(2)*

Highest math level course taken

Math level did not influence FCI score; nor did it interact with gender; gender gap seen

High school math and FCI score

# of High school math courses	Avg. % score (N)	Males/ GFCI	Females/ GFCI	Males/ FCI	Females/ FCI
	1		13 *(1)*		7 (1)
	2	28 *(6)*	14 *(2)*	27 *(2)*	19 *(6)*
	2.5				10 *(1)*
	3	26 *(30)*	24 *(24)*	30 *(17)*	20 *(45)*
	3.5		27 *(2)*		27 *(4)*
	4	29 *(30)*	21 *(49)*	34 *(29)*	21 *(37)*
	4.5	59 *(1)*			
	5	44 *(2)*	25 *(1)*	30 *(1)*	33 *(2)*
	5.5				27 *(1)*
	6				27 *(1)*

Number of high school math courses taken did not influence FCI score; nor did it interact with gender; gender gap seen

College math and FCI score

# of college math courses taken	Avg. % score (N)	Males/ GFCI	Females/ GFCI	Males/ FCI	Females/ FCI
	0	25 *(21)*	24 *(36)*	29 *(12)*	21 *(35)*
	1	28 *(26)*	20 *(28)*	36 *(21)*	22 *(30)*
	2	29 *(12)*	21 *(11)*	27 *(10)*	19 *(22)*
	3	31 *(7)*	23 *(2)*	28 *(2)*	20 *(8)*
	4	43 *(4)*	33 *(2)*	42 *(3)*	20 *(2)*
	5			13 *(1)*	13 *(2)*
	6			40 *(1)*	10 *(1)*

Number of college math courses taken did not influence FCI score; nor did it interact with gender; gender gap seen

Conclusion: Math background and FCI score

Math background does not have an effect on FCI score for this sample

An ANOVA analysis of the data suggests the same conclusion: math doesn't make a significant difference

Math and gender did not interact for this sample; but gender gap did show up

➔Math background doesn't explain gender gap