Gender, Educational Reform, and Instructional Assessment: Part II

Catherine H. Crouch Laura McCullough Eric Mazur Daniel L. MacIsaac

AAPT Winter Meeting 22 January 2002 **Do men outperform women in college physics?**

If so, what can we do about it?



Examine FCI scores and grades by gender and high school background

Data from eight introductory courses (N = 2777)

Sample includes wide range of students, classroom settings, pedagogy

Do men outperform women in college physics? YES (on average)

Possible sources:

Culture

High school physics

College course pedagogy

Instructor gender

Possible sources:

Culture

High school physics

College course pedagogy

Instructor gender

Gap exists between men and women with same physics background

Possible sources:

Culture

High school physics

College course pedagogy

Instructor gender

Gap exists before class starts

Possible sources:

Culture

High school physics

College course pedagogy

Instructor gender

Reform effort offers opportunity!

Does pedagogy affect observed gap?

Classify courses as traditional, hybrid, or fully interactive

Courses use Tutorials, Peer Instruction, Studio Physics, Coop. Group Prob. Solving



Traditional courses





Traditional courses





Hybrid courses





Hybrid courses





Fully interactive courses





Fully interactive courses





FCI summary:

Women score lower on posttest

Harvard (fully interactive) and TTU (hybrid) show greater gain for women

Others show comparable gain (and lower <g>) for women



FCI summary:

Women score lower on posttest

Harvard (fully interactive) and TTU (hybrid) show greater gain for women

Others show comparable gain (and lower <g>) for women

Pedagogy may help, but no simple answers



Harvard calculus-based, 1990-1997





Harvard calculus-based, 1990-1997





What about grades?



Purdue grade distribution



Similar results from all schools



What differentiates courses within groups?

Female-friendly pedagogy:

Cooperative class environment

Opportunities to ask and explain

Hands-on experience with equipment

Female-friendly pedagogy:

Cooperative class environment

Opportunities to ask and explain

Hands-on experience with equipment

Participation matters!



What differentiates courses within groups?

Is assessment part (or all) of the problem?

What is the role of instructor gender?

Gender gap in FCI posttest and grades seen at all eight schools

Gap begins before college

Pedagogy may help, but needs further study

Reform effort has an opportunity!

Funding: National Science Foundation

Data: K. Kelvin Cheng, Karen Cummings, Linda Jones, Thomas Keil, Janet Seger

For a copy of this talk and additional information:

http://mazur-www.harvard.edu



Traditional courses





Harvard grade distribution

