

Physics 4810 / 7810: Perfect 10 - who are we really teaching?

Day 18: Fa2008: Application
Gender, Race
Inclusion
Stereotype threat

Class-updates:

- if you're not getting hard-copy back
I'm not tracking your participation
- do you want me to reply online:
 - benefit: legible
 - downside (?): public



Two Part Workshop

- I. Gender /Race in the big picture and its role in science (and visa versa) -- **Tues**
- II. Rising to the concrete: local research / practice that might have something to say -- **Today**

"I think of these latent functions as the true goals/intentions of the more obvious functions of a particular objective"

Approach

We will be inclusive and respectful in our class discussion:

Respect ideas / people: DISCUSS... DEBATE
IN CONSTRUCTIVE WAYS:

Inappropriate: "Crazy"

Appropriate: "This goes too far ... because..."

Part II

- Transforming Classes:
Research-Based Practice and Inclusion

Mechanisms of Bias

- Implicit / Internalized Bias
- Stereotype Threat
- Systemic Bias

Systemic Bias

Reigning paradigms

As for the "queen bees", I have previously heard of women who "pull the ladder up after them". What is the source of this behavior?

What are our goals

- I fully support equal opportunity for women in the science, but it not obvious why there must be a certain percentage

Approach

- one aspect of science that I have always enjoyed is the fact that it involves argument, the defense of ideas, and competition (Dancy 2008). Has anyone ever been off-put by any of these properties of science?

Questioning the Meritocracy

- Competition!
- Break into two groups 1's and 2's
- Gonna Race!
 - Egg Race
 - 4 lengths
 - Winners gets accolades and a shinny chocolate

- Group 1:
 - Get to cheer on team
- Group 2:
 - DO NOT CHEER TEAM!
- SETUP COURSE
- Questions? -
- LET's RACE

??

Questions

- Did you know the race outcomes before you started?
- How did it feel ? (Group 1 and Group 2)
- We all come with privileges and are subject to exclusion:
 - Come up with an example of privileges (where you get the ladle)
 - Come up with an example of bias against you (where you get the spoon)

Examine HW

- Explicit forms of bias?
- Implicit?
- Share in groups

Exercise

- Come up with a classroom practice that is gendered
- Come up with a science practice that is gendered

AIP Statistics:

- 50% of physics students in h.s. are female
- 22% of bachelors in physics go to women
- 10% of faculty in physics are women

In introductory physics there is a Gender Gap:
male students perform better than female students

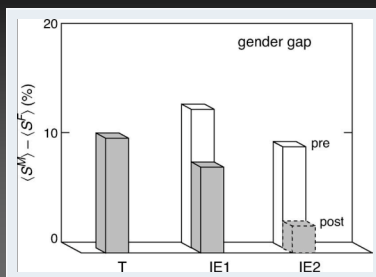
Known: (PER Community)

Interactive Education better than Traditional Lecture

Claim: (Harvard)

Interactive Education does away with the gender gap

Results from Harvard

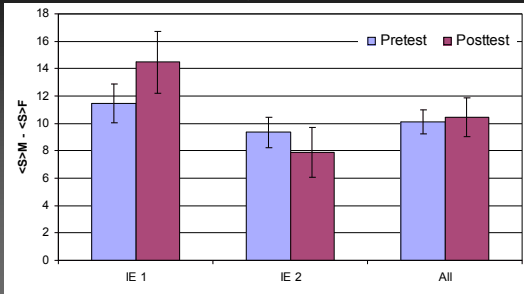


Lorenzo et. al. *Am. J. Phys.* 74, 118 (2006)

CU Data

- 7 semesters (sp04 – sp07) introductory, calculus-based mechanics (PHYS 1110)
 - 3 semesters IE 1 (without Tutorials)
 - 4 semesters IE 2 (with Tutorials)
- Matched FMCE pre/post data (N ~ 2100)
- Course grades (N ~ 3600)
- Demographic and background data (N ~ 3600)

Gender Gap in 1110 Pre and Post Scores 7 semesters; 2100 students



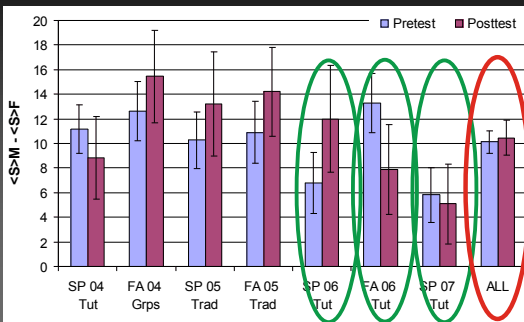
Pollock, et. al. *Phys. Rev. ST PER*, 3, 010107 (2007)

Course Grades

	Participation	Homework	Exams	Course GPA
$\langle S \rangle_M - \langle S \rangle_F$	-5.6 * (0.9)	-4.5 * (0.8)	4.5 * (0.6)	0.11 * (0.04)

- 7 semesters, $N \sim 3600$
- Average differences in % points, except GPA
- Differences offset one another

No Consistent Story by Semester



Conclusions

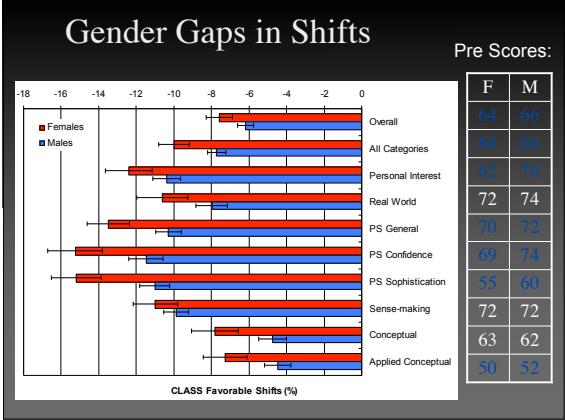
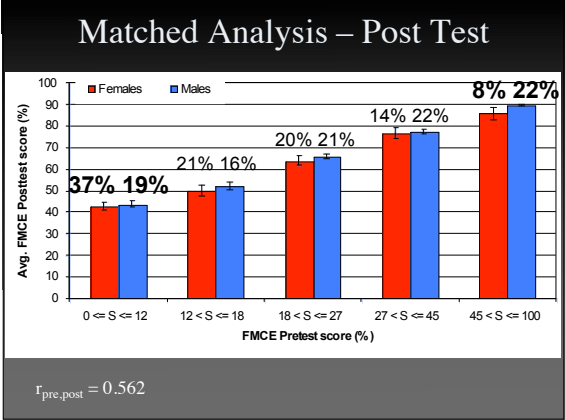
- Despite IE 2 techniques, gender gap persists
- Harvard claims results independent of instructor, we see otherwise

Where does this lead us?

- What influences the gender gap?
Why does it exist?
- Preparation and background?
- Math skill?
- Attitudes and beliefs?
- Faculty practices?
- Other factors?
- Where else do we see a gender gap?

Background physics knowledge

- Is pretest a factor?
- Matched FMCE pre/post data
- $N = 2099$



Multiple Regression

- What is the difference between a male's and a female's scores, after controlling for several important factors?
- Sample of 1027 students (30% of population)

Building the Model

Dependent Variable: FMCE Posttest

Independent Variables: Gender
FMCE Pretest
Math Score
Attitudes & Beliefs

Other Independent Variables: HS GPA
HS Physics
HS Calculus
Ethnicity

Regression Model

$$POST = b_0 + b_1 FEMALE + b_2 PRE + b_3 MATH + b_4 BELIEFS + b_5 FEMALE \times PRE$$
