Digression on pre-class reading

Helps with almost every teaching method.

This session example where reading VERY helpful.

Implementation that consistently gets 80+% reading, and with desired goals. (paper on it, now or soon at CWSEI.ubc.ca)

- Targeted readings
- Accountability (quizzes with name/grade, credit*(small)*)
- Don't repeat material in class

19 of you did not do quiz AND I KNOW WHO YOU ARE!
I AM VERY DISAPPOINTED!

Why superb pedagogy and curriculum sometimes fails, and what you can do about it

Addressing social-psychological barriers to student success and retention
(particularly for historically under-represented)

Carl Wieman

Goals

You will be able to:

* recognize situations in physics classes where social-psychological factors likely to impact success of some students (particularly historically underrepresented)
* explain why these situations have impact (student's perspective)
* design interventions that improve student success

OUTLINE

I.   Introduction

a.   Many factors contribute to lack of diversity in physics. Today, issue *you* can control.

b. My limitations *(well informed novice, bad intuition)*

c. Big Problem for intuition—cognitive learning (rest of NFW) Practicing expert thinking. Better = more time & more explicit Psychological stealthy!

II. Discuss reading quiz and reading

III. Examples of data from research

IV. **Grp Ex.** Where likely occurs in your teaching contexts.

V. **9:40 Grp. Ex.** Designing an intervention *and way to measure impact.* 20 min.

VI. Presentation and discuss/refine 5? examples. 15 min.

Advance apology.

III. Examples of data from the research

1. Large Intro Physics class
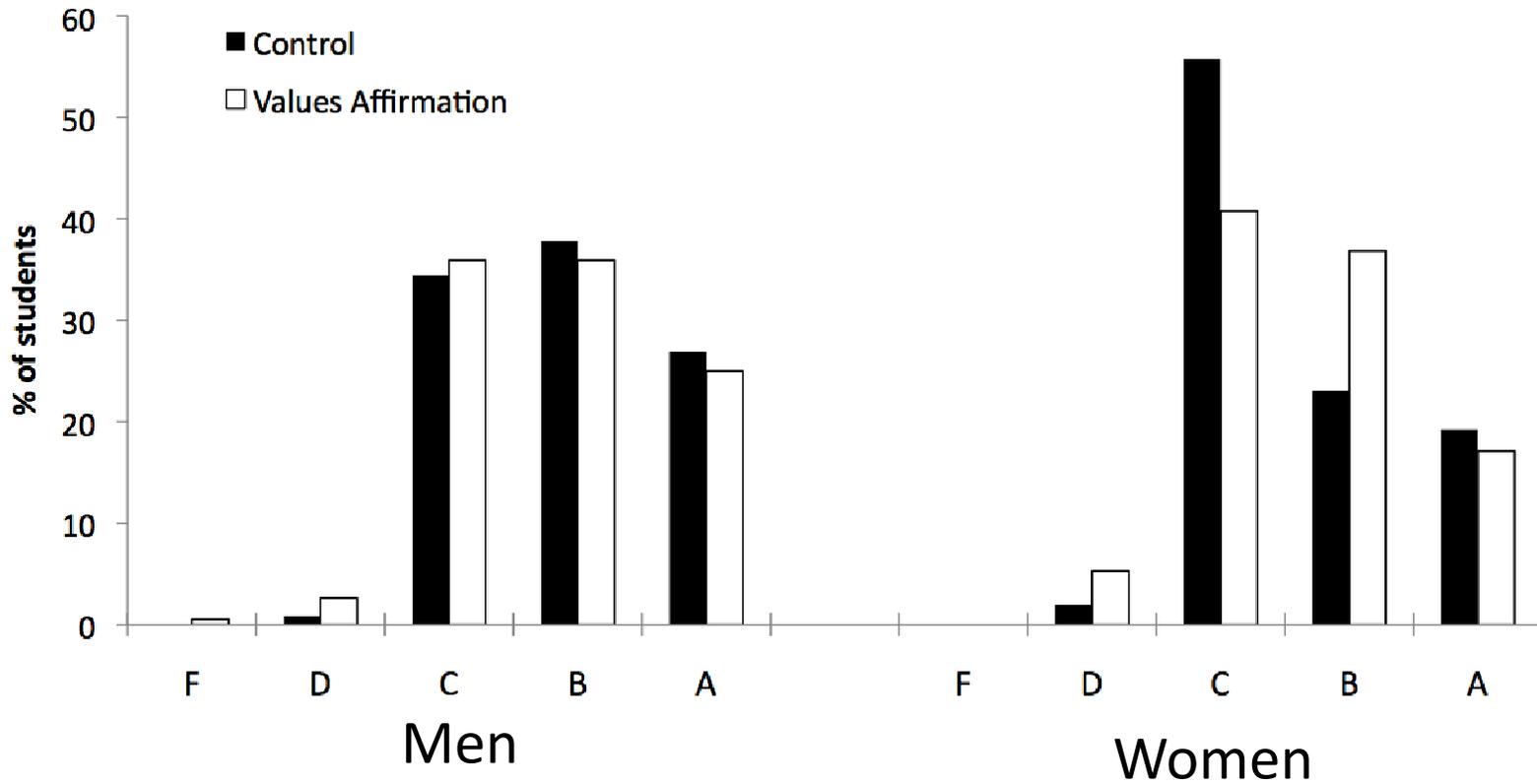Miyake, Kost, et al, *Science* Dec 2010

Affirmation exercise.

15 minutes in class week 1. Again in week 4 in online homework.
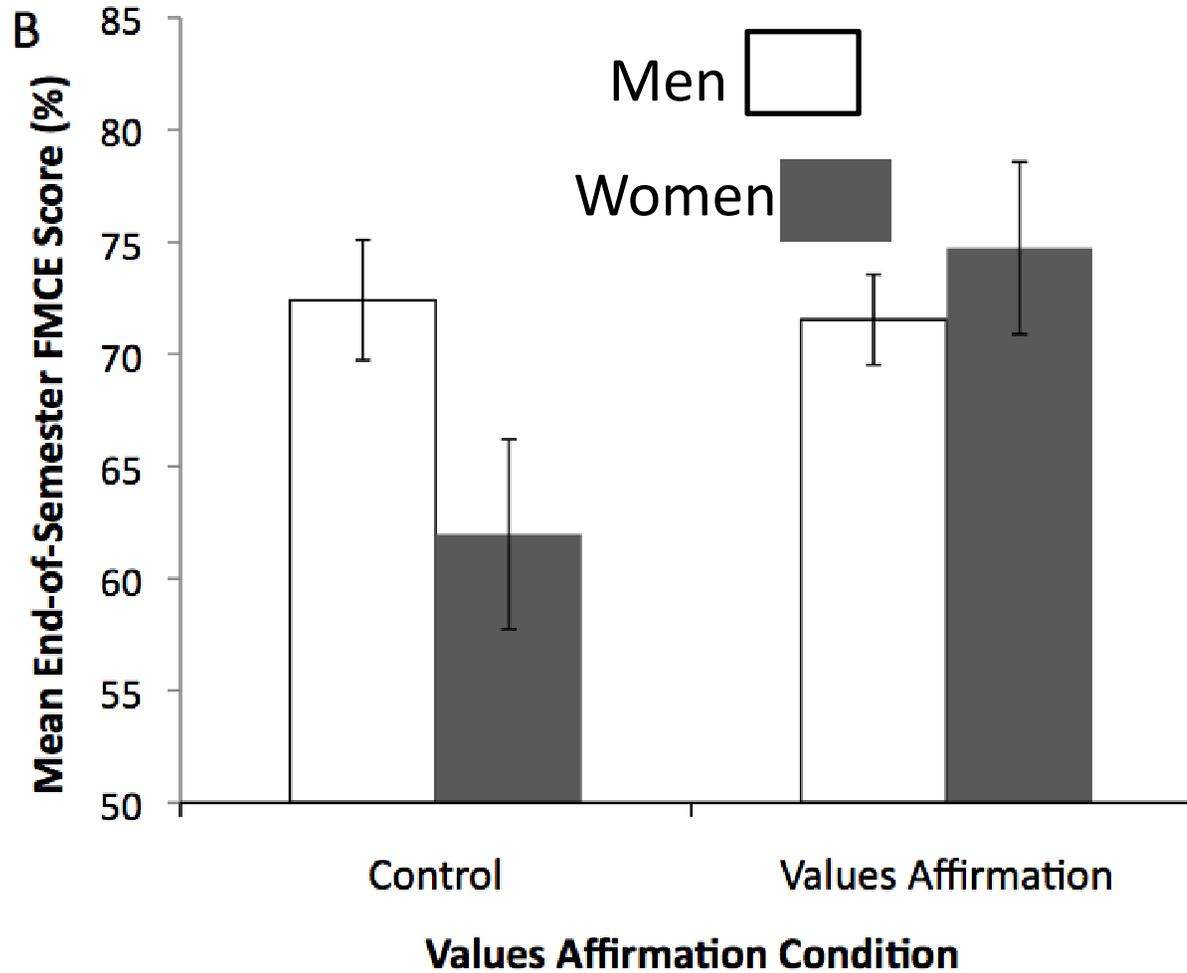
Selected their most important values from a list (such as relationships with friends and family or learning or gaining knowledge) and, in response to structured prompts, wrote about why.

Control group- wrote about study skills.

Affirmation Impact: Grades

Miyake, Kost, et al, Science Dec 2010

Affirmation Impact: FMCE post

Miyake, Kost, et al, *Science* Dec 2010

2. Stanford Intro Physics course
Aguillar, Barchat, Walton

Standard belonging intervention
+ slightly structured group activities in recitation
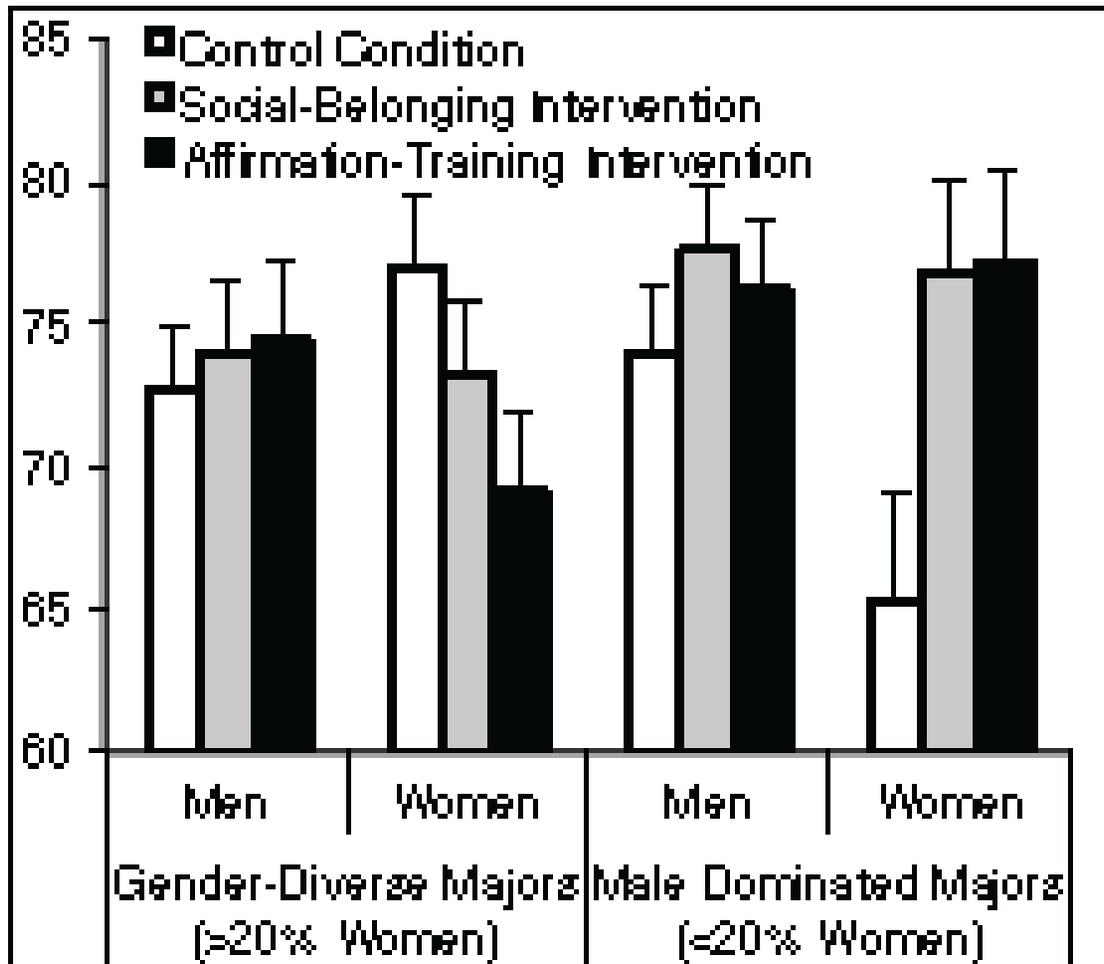*(First, think for minute, then go around and everyone briefly say what they think. Then proceed as usual.)*

Control (study skills)--
Women improve significantly with belonging intervention.
Significantly more if combined with structure in recitation.

3. Women's Experience, Relationships, and Achievement in Engineering (Proc. Nat. Acad. Sci.)

Gregory M. Walton, Christine Logel, Jennifer M. Peach, Steven J. Spencer, Mark P. Zanna

extremely selective program

engineering majors

45-60 min intervention
Belonging, or affirmation

Error bars—stand. dev.
60 =failing
80 =Deans list

Many broader impacts on women's views.
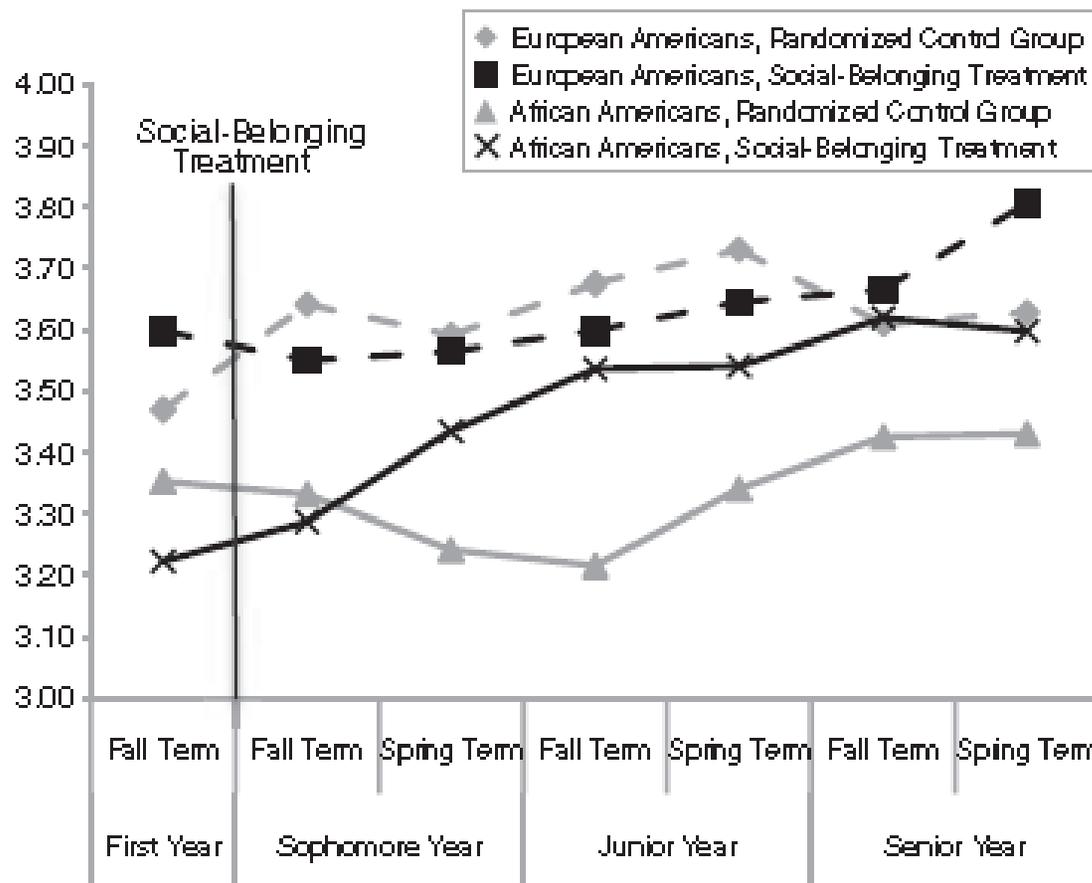*Attitude about going into engineering.*

4. **A Brief Social-Belonging Intervention Improves Academic and Health Outcomes of Minority Students**
Gregory M. Walton, et al.
Science **331**, 1447 (2011);

VERY elite academic institution

Belonging intervention. Read report on how most students worried about if they belonged in college early on, but got more confident over time. How was same across ethnic and racial groups. Prepared presentation on the material to help future students.

Legend:
- European Americans, Randomized Control Group
- European Americans, Social-Belonging Treatment
- African Americans, Randomized Control Group
- African Americans, Social-Belonging Treatment

Social-Belonging Treatment

Ratio of # in top class/# bottom, different by 2.5

Many broader impacts (fewer doctor visits)

3 years later, barely remembered

Summary

Student comes in with question "Do I belong?", "Can I succeed", ...
(perceptions of others seen as relevant)

Puts in stress, distraction, reduces motivation, ...
$\Rightarrow$ Reduced test performance and learning.

Many events send answers

more doubts ➡ more likely events will reinforce doubts

Break feedback loop– substitute alternative narrative by
which to interpret events, so not seen as globally significant

II. Discuss prereading quiz

Last question, small majority got correct.

All others, no option got majority, including correct answer.

Likely to increase, decrease, or no effect on achievement gap?

2. Scheduling a weekly help session or office hour for students that are having difficulty with the class, and sending out individual emails to at-risk students inviting them to attend.*
  Increase achievement gap– reinforcing message you think they are likely to fail

3. Being careful to praise all student questions and answers that are offered during class, particularly those offered by underrepresented students.*
Increase—conveys low expectations (pg 65)

4. Adding a note to each student's graded homework assignment saying that you graded tough, because you thought they were capable of meeting a high standard.
Decrease– indicates you think they can succeed, not grading harshly because you think they do not belong or are inferior (Yeager study)

5. Telling students this is a hard physics class that many fail, and so they need to work very hard, but you will help them to succeed.*
 Increase– emphasizes that many will fail, thus likely them. Initial effort and failure will encourage to give up, rather than finding different , better, strategy.

*very common error, including by me

6. You are doing a psychological intervention to convince students that everyone has difficulties with physics classes, but that difficulties usually go away over time. Pick which of the following formats is likely to be the most effective:

 giving students an assignment to write a short paper to convince future students of this fact;
 devoting a lecture period to your talking about these difficulties and how they can be overcome;
 having students have this discussion amongst themselves in small groups;
 all three formats are likely to be equally effective.

giving students an assignment to write a short paper to convince future students of this fact;

Before 9:35 ???

5 min. Group Exercise-- Where are these psychological effects likely to occur in your teaching contexts?

Discuss in groups. Random selection to report out.

9:40 20 min. Group Exercise. Design an intervention _and way to measure impact._
Subtle + poor intuition makes measurement essential!
(random selection to report out, general discussion of possible concerns and refinements)

"stealthy"–
- short-lived,
- random or no differentiation amongst students,
- saying-is-believing

Final observations if needed.

If before 9:25--

Can you think of some time when you were in situation where you how doubts that you belonged?
How did it affect your perceptions?

(take a couple of minutes thinking about, discussing with neighbors if you like)

My own situation as new Assistant Prof.

Sense of physics identity--before

Jane G. Stout,[1] Tiffany A. Ito,[1] Lauren E. Kost-Smith,[2] Geoff L. Cohen,[3] Noah D. Finkelstein,[1] Akira Miyake,[1] & Steven J. Pollock[1]
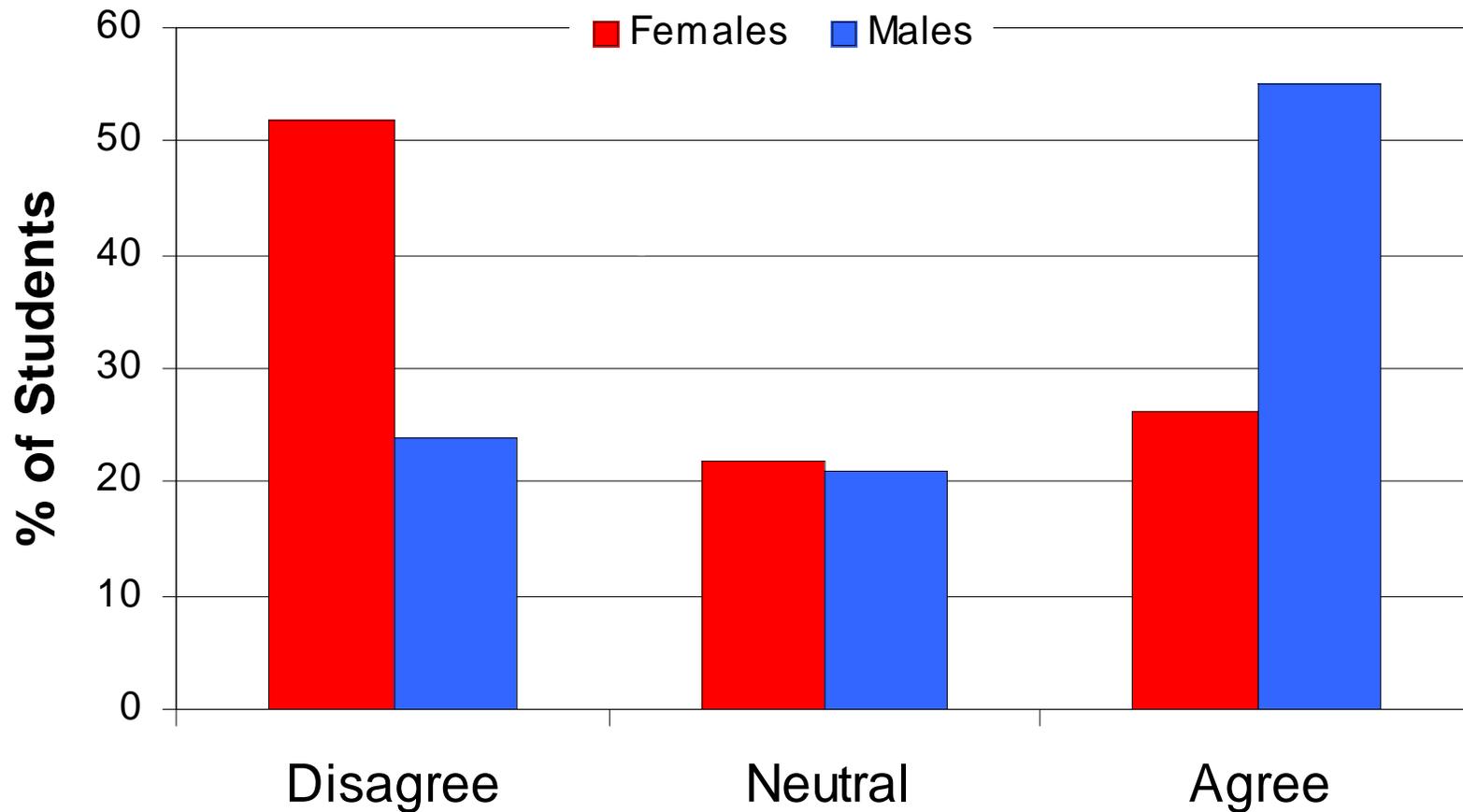
- I feel like I could be a good physicist.

Fig. 1