

# A GIRL WALKS INTO A SCIENCE CLASSROOM

An investigation into feminist physics and science education.

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**RANDOLPH-MACON**  
COLLEGE



# Today's Plan

- How I got here
- What is feminist science?
- Themes of feminist science
- How it works
- The lesson plan

# How I Got Here

- Feminist Science Fiction
- How can feminism make a superfluid colder?



<http://www.thefrisky.com/>



[http://www.philsp.com/mags/science\\_fiction\\_quarterly.html](http://www.philsp.com/mags/science_fiction_quarterly.html)

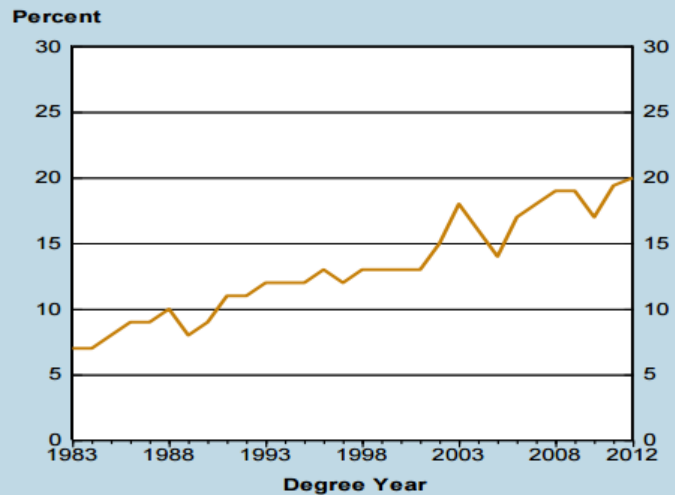
# Feminist Science

- Feminist principles applied to science
- Themes
  - Women
  - Diversity/Inclusivity
  - Research
  - Epistemology
  - Education

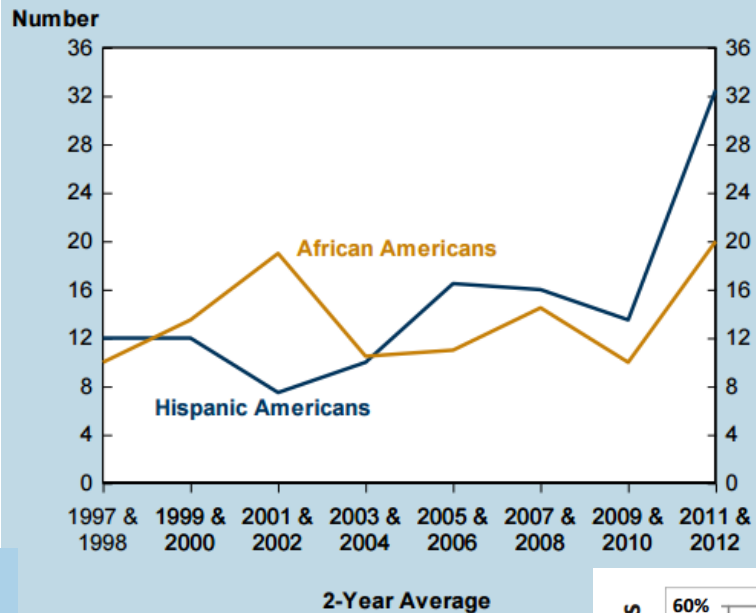
“What unique perspective does a minority student bring to the physics classroom?”

- “My arguments suggest that the collaborators, [...] the agents who generate knowledge are communities and sub-communities.” – Lynn Nelson
- “Roberts is thinking only about the answers, not the process of arriving at them.” – Thomas Levenson

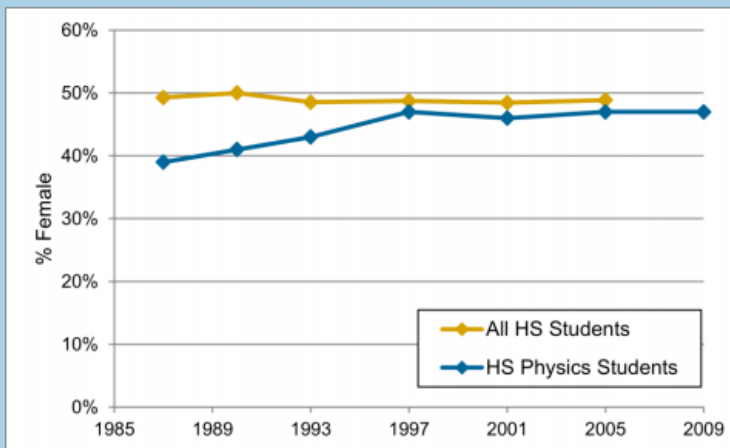
**Percent of Physics PhDs Earned by Women, 1983 through 2012.**



**Number of Physics Doctorates Earned by African Americans and Hispanic Americans, Classes of 1997 through 2012.**

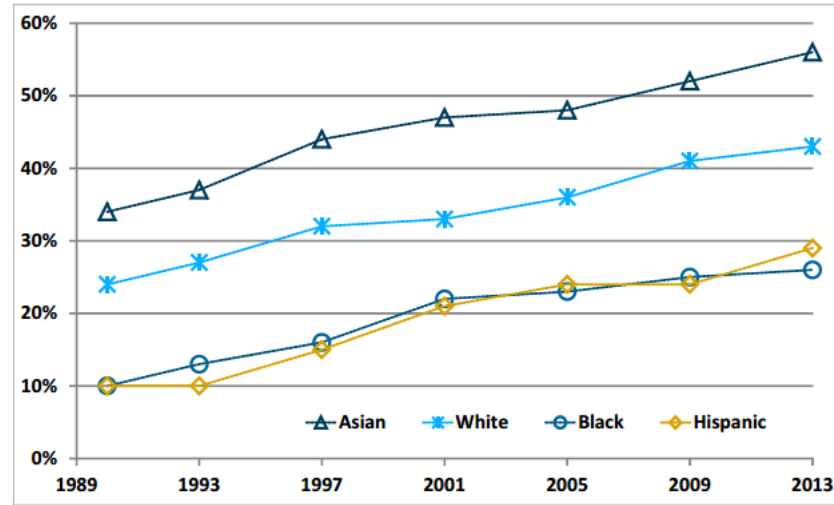


**Proportion of Females among US High School Students All US High Schools**



Data for all high school students from US Department of Education, National Center for Education Statistics

**Proportion of students taking physics**



Years

# How do you eat an elephant?

- Content vs. Context Driven Physics
  - “Here we begin, not with a set of assumptions and theories and experimental methods, but with a set of problems tied together by their context.” – *Whitten 2012, pg. 116*
  - Question vs. Problem
- How does this play out?

# Content Driven

- Accepted pool of knowledge
  - Solar energy
- Questions about the knowledge
  - How can we harness it better?
- Experimentation
  - Different ways to harness it
- Peer review/publication
  - Eventually a product (higher efficiency solar panels)



# Context Driven

- Find a problem
  - We need higher efficiency solar panels
- Learn the physics involved
  - Condensed matter
- Find a solution
  - Experiment
- Apply to problem
  - Create and install solar panels

So how does this work  
in school?

# Circuits (Traditional)

- Pool of Knowledge
  - Lecture/PowerPoint on circuits
- Questions
  - Can you make this bulb light up?
- Lab/Experiment
  - Building circuits
- Results
  - Concluding questions
  - Homework assignments

# Circuits (Feminist)

- Find a problem
  - How do we make this bulb light up?
- Learn the physics involved
  - How circuits work
- Find a solution
  - Which circuit type is best for a bulb
- Apply to problem
  - Create circuit

# The Lesson Plan

- Traditional vs. Feminist
- What's included
  - Pre- and Post-examinations
  - Interactive engagement
  - Discussion
  - Context driven
- How it was developed
  - Comparing lesson plans
  - Looking at work books
  - Unstructured interviews

## Circuits

Objective	To understand elements of circuits, how circuits are constructed, and parallel vs. series circuits.
Keywords	Circuits, batteries, voltage, current, parallel circuits, series circuits, resistance, and ohms.
Supplies/Set-Up	Laptops, circuit builder sets (battery, wires, clips, and bulbs). Students should sit at tables in groups of 4-6. Ideally, each student will have a single partner, but there may need to be a group of three. No student should work by themselves. One table should consist of all female students and another table should be all male students. The other tables should have mixed genders.

# The Lesson Plan

- How do circuits work?
  - Can you get a bulb to light?
  - Discussion
    - How did this bulb light?
- Series vs. Parallel
  - Can you get two bulbs to light?
  - Can you make one light, one not?
  - Discussion
    - What are the differences in the two circuits?
- Resistance
  - Can you make a bulb dim?
  - Do different types of circuits affect brightness?
  - Discussion
    - How does resistance affect bulb brightness?
- Closing
  - Question students to make sure they retained key concepts: basic circuit form, parallel vs. series, and resistance.

# Final Thoughts

- So how does feminism make a superfluid colder?

# References

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