Working and Teaching in a Diverse University

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My Background

- Went to high school in Vermont
- Undergraduate degree in math and physics from Kenyon College (2003)
- Graduate degree in theoretical physics from University of California, Berkeley working under Hitoshi Murayama (2003-2008).
  - Was a TA for 3.5 years (and 3 summers) out of 5. TA/Head TA for pre-med physics
- 1st postdoc at Caltech (2008-2010)
- 2nd postdoc as the Schramm Fellow at Fermilab (2010-2013)
- Research faculty at Rutgers, followed by tenure track faculty (2013-today)
  - Here I teach 110, 341, 444, grad GR, grad cosmology, …

What is this talk about?

- Being a graduate student places you all in a new role in academia
  - This entails new responsibilities, to your students and to your peers

- Rutgers is a public university serving the population of a diverse state.
  - We have a responsibility to our students to learn and improve our teaching.
  - What issues might affect our students in ways that we might not be aware of?

Transitioning from Student to Graduate Student

- You are now **authority figures**.
  - The behavior you display will be noted and responded to by the younger students around you.
  - You may be the most influential teacher any of your students has. For good or ill.

- You are now **academic colleagues**.
  - Your reputation within the field and among your future collaborators, letter writers, and hiring committees starts to accrue now.
  - Demonstrating professionalism towards your colleagues and students now will pay dividends later.

Transitioning from Student to Graduate Student

- Graduate school is both more solitary and more collaborative than undergrad.

- Undergraduate (especially 4 year programs directly into grad school):
  - Clear progression of coursework
  - Clear expectations and evaluations (ideally)
  - Well-defined goal (grad school), and needed benchmarks.
  - “Easy” to compare to your cohort.

- Grad School
  - Classes matter, but aren’t why you’re here.
  - More responsibilities, and a need to balance between them.
  - Your cohort will “progress” at different rates. This is *expected*
  - Science requires collaboration.

Don’t apply a competitive mindset to your colleagues
Concentrate on what *you* need to do to be successful.

Teaching as a Grad Student

- Graduate school is often your first formal opportunity to learn how to teach.
  - It might be your *last* until they toss you in front of a class as a professor.

- Teaching and mentoring is one metric on which faculty hiring is based.
  - Not just formal in-class teaching, but mentoring and peer-to-peer interactions
    - Applies to lab positions as well as professorships.
  - Does a candidate have a track record of improving the knowledge base of the younger people around them?
  - We want to be able to say good things about you.

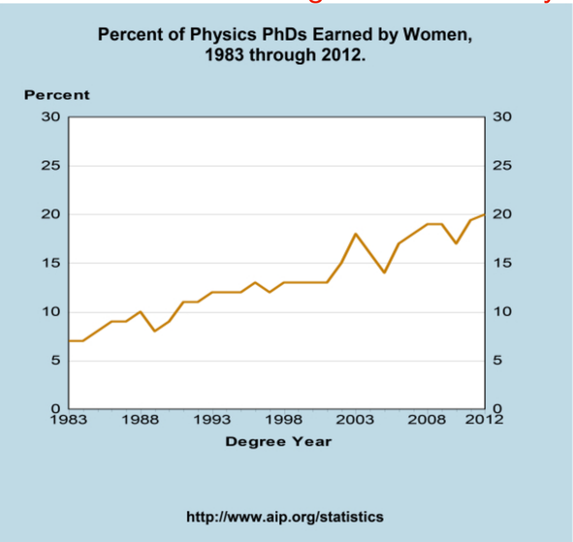
In my personal experience, thinking carefully about how to explain a concept to others forces me to understand it better.

Teaching at Rutgers

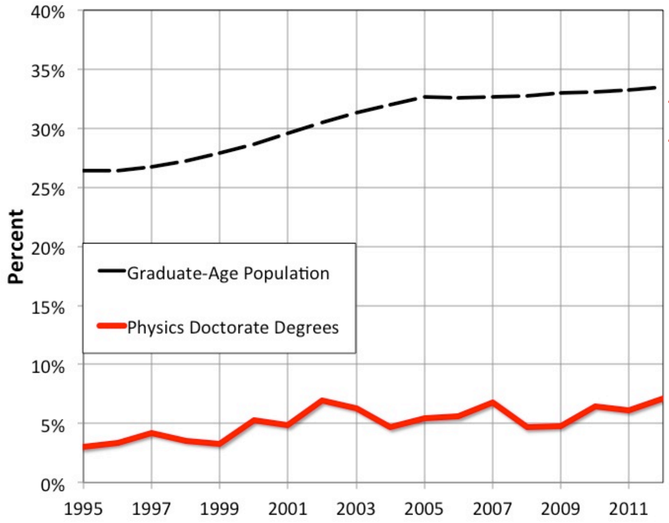
- Rutgers is a highly diverse university, reflective of a highly diverse state.
  - We are employees of the state of New Jersey, and have a responsibility to the people of the state to provide a quality education to *every student here*.

25% of the incoming undergraduate class at Rutgers are 1st generation college students.

versus 50% of the population
and 55.4% of the Rutgers student body



- The make-up of the Rutgers student body is statistically different from the make-up of the physics community, and of our graduate students.



Black/African American
+ Hispanic/Latino
+ Native American

(25% of the Rutgers student body)

Teaching at Rutgers

- Becoming an effective teacher (of physics, astronomy, or any other subject) requires understanding your students and their needs.

- Every student is different, but there are patterns in the educational experiences of students from groups that are underrepresented in science, technology, engineering, and mathematics (STEM).
- Understanding these patterns can help you help your students who are members of one (or more) of these groups.
- Thoughtful teaching will help all your students.

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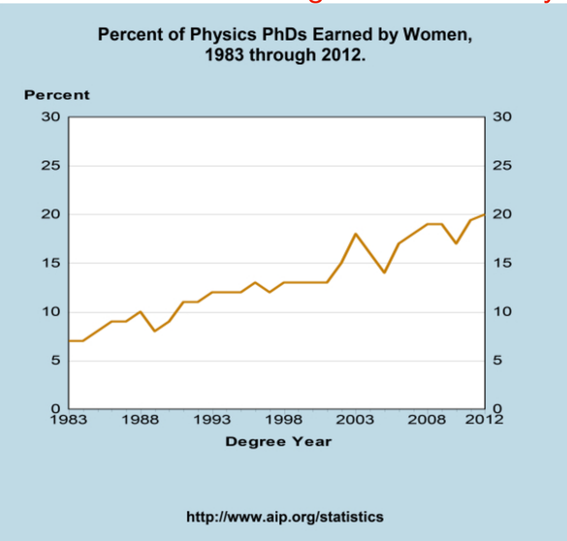

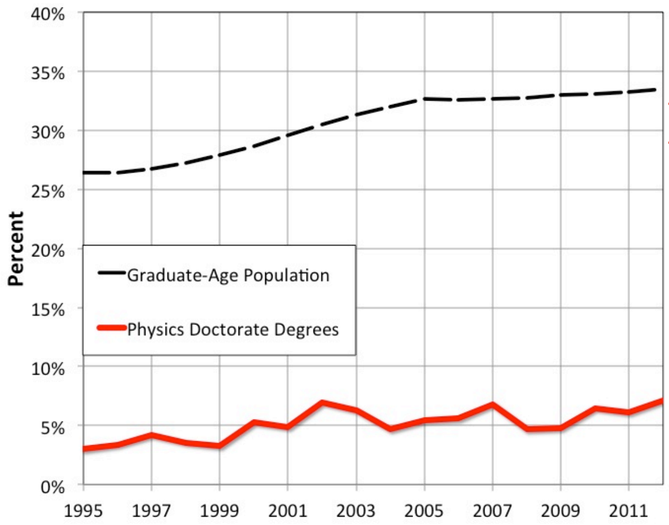

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Diversity in the Academy

- **2013 AAS membership statistics**
  - 73% male, 25% female, 2% DNR
  - 84% white, 8% Asian American,
  - 3% Hispanic/Latino, 1% black/African American,
  - 0% Native American/Alaskan/Hawaiian, 8% DNR

- **2013 U.S. population**
  - 49% male, 51% female
  - 63% white, 5% Asian American,
  - 16% Hispanic/Latino, 12% black/African American,
  - 1% Native American/Alaskan/Hawaiian, 3% other

Diversity on Campus

- Students' identities have many dimensions:
  - age
  - family economic background
  - disability (physical or otherwise)
  - gender identity (male vs. female vs. non-binary; may be different from assigned-at-birth gender)
  - language(s)
  - national origin
  - race/ethnicity
  - religion (or lack thereof)
  - sexual orientation
  - veteran (ex-military) status

Students might not know how to navigate the academic and university bureaucracy, or know what steps to take to advance their future career.

Students may be dealing with personal issues (food insecurity, health issues, childcare, family care, visa issues, *etc*) that you may not have personal experience with.

None of these attributes should have any bearing on a student's ability to learn and enjoy physics.

What are we losing?

- Less science:
  - We may be losing potentially brilliant physicists and astronomers to other professions.

- Less grant funding:
  - The U.S. government supports broadening participation: every National Science Foundation proposal must address broader impacts, i.e., “societally relevant outcomes” that include “full participation of women, persons with disabilities, and underrepresented minorities in... STEM.”

- Less fairness:
  - Equal opportunity is worth fighting for!
  - Fundamentally, ensuring everyone who wants to explore science has the opportunity to do so is the *right thing to do*.

Teaching in a Diverse Setting

- Stereotype threat – experienced by student
- Impostor syndrome – experienced by student
- Unconscious bias – experienced by teacher

Stereotype Threat

- One consequence of small numbers is the (wrong!) popular stereotype that members of underrepresented groups are not good at physics.

- Students from groups that experience negative stereotyping do worse when being evaluated (e.g., on tests) than equally capable students – especially when they are "reminded" about their group membership!

    - First demonstrated by Claude Steele ("Thin Ice: Stereotype Threat and Black College Students" 1999).

Stereotype Threat

- Pick two groups of students with similar academic records, grades, etc. Group A shares a trait (gender, race/ethnicity, etc.) about which negative stereotypes regarding ability exist; group B does not.

- Give the same test to both groups:
  - If the test is presented as a measure of ability, students in group A do worse than students in group B.
  - If the test is presented as a study of how people solve problems (not an assessment), both groups do the same.

- The results of this experiment have been seen hundreds of times in different contexts:
  - black students taking verbal tests
  - female students taking math tests
  - lower-class French students taking verbal tests
  - white male students taking math tests on which they have been told Asian students do better

- Mechanism is the (often unconscious) depletion of mental energy and focus due to anxiety and forcing oneself not to think about the stereotype.

Stereotype Threat

- Stereotype threat (causing a gap in performance) can be induced in members of a stereotyped group by a variety of prompts:
  - description of a test as diagnostic of ability
  - request for students to reveal hidden information about themselves (e.g., history of mental illness)
  - presence of additional test-takers from a group about whom no negative stereotypes exist
  - request for photo identification, demographic information on a test answer sheet, etc.

Stereotype Threat

- Stereotype threat can be reduced by several strategies:
  - do not describe tests as diagnostic of ability
  - arrange sustained, positive interactions with students from other groups: can show that different groups can have very similar anxieties
  - when delivering criticism, emphasize that you have high standards that you believe students can meet
  - emphasize that intelligence and ability are not fixed, but can be improved (“incremental,” not “entity”)
  - encourage students to self-affirm (e.g., at start of semester, describe what values are important to them)

Avoid describing concepts as trivial, remedial, “as we learned in kindergarten”, etc

Impostor Syndrome

- Students (and professional scientists) can have trouble internalizing their accomplishments, and feel that they “don't belong” in their current situation and/or will be “found out.” This is the impostor syndrome.
  - I’ve experienced it, many times in my career.

- Impostor syndrome is worse for members of underrepresented groups, who have less external evidence that people like them “belong.”
  - Example: if male and female students get same grades on a tough physics test, female students are more likely to conclude that they are not good at physics.

Impostor Syndrome

- Approach # 1: let students know that the syndrome exists, and that they are not alone in feeling it (if they feel it). Even very successful people are subject to doubts some of the time!

- Approach # 2: provide positive feedback (as appropriate), e.g., identify when tests are tough and what the median score is. Reach out to affirm student successes.

- Approach # 3: don't let students denigrate their successes or attribute them to luck.

Unconscious Bias

- A schema is a preexisting mental structure (i.e., organized information) that we use to help process new information – effectively, it is a mental short-cut that our minds deploy without thinking about it.

- Schemas can be influenced by prior exposure to stereotypes about different groups of people. This can lead to unconscious bias in our evaluation of others.

- Anyone can suffer from unconscious bias.

Unconscious Bias

- Moss-Racusin et al. (2012) sent nearly identical resumes of a fictitious student applicant for a laboratory manager position to 127 STEM faculty members. Half of the resumes were from “John” and half from “Jennifer.”

- Both male and female faculty members (on average) rated John as more competent, worthy of mentorship, and deserving of a higher starting salary.

- Similar studies have shown, e.g., bias against job applicants with Muslim names in France.

In my own age/generational cohort, the most impressive/accomplished physicists in my subfield do not appear like the widely held schema of “what a scientist looks like” would imply.

Unconscious Bias

- Unconscious bias in the classroom affects our perceptions of who speaks: e.g. female students often speak less but are perceived as speaking more.

- Make conscious efforts to involve all students in a class in group discussions (e.g., by inviting each to comment), and calling out duplicative comments.

- In supervising group work, don't allow a few students to dominate a discussion, and make sure that quieter students' voices are heard.

"That's an excellent suggestion, Miss Triggs. Perhaps one of the men here would like to make it."

Don't be this speaker, and don't let this happen in your classes

Rutgers Physics Policy

- Statement against Discrimination and Harassment:

  “The Rutgers Department of Physics & Astronomy strives to foster an academic, work, and living environment that is respectful and free from discrimination and harassment. The Department recognizes the human dignity of each member of the community and believes that each member has a responsibility to promote respect and dignity for others so that all community members are free to pursue their educational and work goals in an open environment, to participate in the free exchange of ideas, and to share equally in opportunities. The Department affirms its commitment to treat every member of our community with respect and dignity, regardless of race, ethnicity, gender, sexuality, faith, political beliefs, or other aspects of personal identity.”

What's the Point of All This

- You are building your career as a scientist and an educator. How you act reflects on you, your mentors, and the department.
  - Remember that graduate school is a phase transition from undergraduate.
  - Teaching is part of our job, both in the classroom and informally. Take it seriously.
  - This requires respectful interactions with everyone in the department.

- You are teaching in a diverse university.
  - All of our students deserve to feel welcome and respected in our classes.
  - Treating every student as deserving of your time and effort will make you a better teacher.
  - At the most basic level, this is about fairness, respecting the job, and respecting all the people who are making it possible for us to do this job.

Rutgers Physics Orgs

- Rutgers Minorities in Physics and Astronomy (RUMiPA or MiPA):
  - “furthering the interests of, and developing a sense of community among, individuals within the Rutgers Physics and Astronomy department who identify as members of groups that are underrepresented and marginalized”
  - https://www.physics.rutgers.edu/rumipa/
  - mailing list: https://email.rutgers.edu/mailman/listinfo/ru_mipa

- Equity and Inclusion Journal Club (EIJC):
  - https://www.physics.rutgers.edu/rumipa/eijc.html
  - There is a code of conduct.