The PER Community of Practice: The seen and unseen

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AAPT July 2023 (Sacramento, CA)
The PER Community of Practice: The seen and unseen
The Known and Unknown

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Who am I? Where do I come from?
Family: Grandparents

Mother’s Side
Sue and Joe Talamantez

Father’s Side
Clara and Manuel Cid
Family: Parents

Mother: Josephine Talamantez, M.A. (Yaqui/Chicana)
Co-founder of Chicano Park in San Diego, CA

Father: Armando Cid, M.A. (Mexican/Chicano)
Co-founder of Royal Chicano Airforce (RCAF)
Known vs. Taught

Known via family and ancestral knowledge

• Pre-Colonial knowledge
  • Astronomy: Maya and Azteca Calendars, Tribal Star stories, Pyramids, Structural alignment with celestial movement
  • Mathematics: Maya independently created the concept of zero
  • Engineering: Inca, Maya, Azteca Ruins
  • Government: Iroquois Nation (US Constitution)
  • Art and Culture: Gold, Silver, Textiles, Pottery, Frescos (cultural art)

Taught European Histories

• White Europeans primary generators of knowledge.
  • Astronomy: Greek, Chinese, Egyptian
  • Mathematics: Calculus created by Newton
  • Engineering: Ancient European Ruins
  • Government: “The founding fathers”
  • Art and Culture: Fine Art
The lens through which I view and navigate...

• My family, cultural connections, and ancestral knowledge shapes not only who I am, but what I do.

• It is my biggest influence and motivator.

• This means I am biased.
  • I’m rooted in social justice ways of being.
  • I’m in a state of continual learning
DEIJ is the talk of the town...but is it simply the phrase of the moment?

• Diversity, Equity, Inclusion, and Justice are a major focus in higher education as well as in politics.
DEIJ is the talk of the town...but is it simply the phrase of the moment?

• Diversity, Equity, Inclusion, and Justice are a major focus in higher education as well as in politics.

• How are we using these terms and/or ideas?
• What is the value with incorporating these ideas in our PER work?
• Is this work sustainable or only for the moment?
• How do these efforts contribute to the success of our physics populations?
What is the measure of success?

The standard measure in physics is white, male, cis-gendered, non-disabled, etc. so then the question becomes what impact does this have on a person who does not fit this norm?


“Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.”

-Albert Einstein
Who do we study?
Why should I/we care about demographics?

• Differences in my data
• It's personal for me!
  • Where do I fit?
  • How am I (or people like me) represented in thinking about best practices for physics spaces?
• PER
  • Do my students equal your students?
  • Are we still leaders in DBER!?
• Science for Science sake: more variables in the data
It’s personal for me: my lived experiences are often ignored

Indigenous People Exist within Physics: APS Gazette Fall 2020

Who is physics designed for?

- Well prepared (mathematically) from K12
- Primarily White Populations
- Affluent/Wealthy populations

WHERE IS PHYSICS EDUCATION BEING STUDIED/ASSESSED?

- Mainly Elite institutions and PWIs
- Calculus-based courses
- Know practically nothing about HS or TYC

Demographics of PER

• Examined all PER type papers in AJP, PR-PER, The Physics Teacher between 1970 – 2015
  • 417 papers out of 1,031
  • Within these papers, there was about 257,000 students
• Looked at math preparation
• Looked at Socio-economic status
• Looked at ethnic and/or racial breakdown
• Looked at gender (binary) breakdown
• Looked at institutional type
Demographics of PER: Take Aways

• Primarily focus on:
  • Well prepared (mathematically) from K12
  • Primarily White Populations
  • Affluent/Wealthy populations
  • Mainly Elite institutions and PWIs
  • Calculus-based courses
  • Know practically nothing about HS or TYC

• Populations we study are homogenous not diverse (though based on talks I’ve seen, this is changing)
  • A majority of PER work is not supportive of all populations
Moving forward some things to think about
Not all XXX are the same

Indigenous Peoples* of USA and Canada

- 562 Federally Recognized US Tribes
- Not all tribes are recognized
- Not all indigenous peoples are enrolled members of their tribes
- Countries recognize indigeneity differently

Latinx

- Countries
- Continents
- Caribbean Islands
Student Assets and Student Success

• Measures of success traditionally based on what is listed on the CV and/or resume: GPA, Research Experience, Internships, Courses Taken

• Measures of success should be expanded to include lived experiences Ex: Growth (but how do you measure it?)

• Personalize success based on non-uniform baselines
  • Do students come from under-resourced K12 institutions?
  • Do students understand how to navigate academic structures?
  • Do students know how to apply for opportunities?
  • Do students have exposure to variety of subfields, research, industry opportunities?
Justice, Equity, Diversity, Inclusion

• Each of us must define these terms specifically for the populations you are working with
  • Generalized terms do not support the populations you are working with.
  • Listen to the needs of those that you are serving!
    • Does your work center the needs of those you are serving as opposed to centering your expertise?
    • Those population you are serving are the experts on what they need.
      • Listen first!!
  • Recognize that you are not a savior
  • Spend time learning what these specific needs and challenges are.
Effective Ways to look at the whole student

• Know who you are working with.

• Utilize resources that are already known from within your field, but also from other fields such as: Ethnic Studies, Education, Legal Studies, etc.
  • We don’t have to reinvent the wheel

• Do best practices or specific sets of curriculum actually support your student populations?
Beyond the Undergraduate...
The Diversity-Innovation Paradox in Science

Bas Hofstra, Vivek V. Kulkarni, Sebastian Munoz-Najar Galvez, Bryan He, Dan Jurafsky, & Daniel A. McFarland

Click here for the study  Click here for the pre-print  Click here for code

Summary
Diversity breeds innovation and innovation is argued to facilitate careers. Yet, underrepresented groups that diversify organizations have less successful careers within them. We set out to identify the diversity-innovation paradox in science and explain why it arises. By analyzing data from nearly all US PhD-recipients and their dissertations across three decades, we find demographically underrepresented students innovate at higher rates than majority students, but their novel contributions are discounted and less likely to earn them academic positions. The discounting of minorities’ innovations may partly explain their underrepresentation in influential positions of academia.
What about Professional Physicists (us in the room)

• Measures of success
  • Academia, Administrators, National Labs, Directors, Professional Societies

• Faculty:
  • What kind of institution do we have our faculty appointments?
  • Tenure-track vs. non-TT
  • Tenured?

• Grants
  • Funding Sources
  • Total Dollar Amount

• Publications
  • # of publications
  • Author order

• Talks
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• Talks
White researchers have been consistently funded by the National Science Foundation at higher rates than most nonwhite researchers since at least 1999.

From 1999 to 2019, proposals by white applicants were funded at 1.4 times the rate of proposals by Asian applicants and 1.2 times the rate of proposals by Black applicants.

NSF grants make up about 27% of federal funding for basic research at the nation’s colleges and universities.

NSF funding...

Proposal approval rate by race/ethnicity relative to overall annual rate

- White
- Black/African American
- American Indian/Alaska Native
- Asian
- Native Hawaiian/Pacific Islander
- Hispanic or Latino
- Multiracial
NSF Funding...

Proposals, Awards, and Funding Rates by PI Race and Ethnicity in 2019

White
- 20,400 proposals
- 6,389 awards
- 31.3% funded

Asian
- 9,141 proposals
- 2,073 awards
- 22.7% funded

Hisp. or Latino
- 1,549 proposals
- 449 awards
- 29.0% funded

Black/AA
- 929 proposals
- 246 awards
- 26.5% funded

AI/AN
- 90 proposals
- 33 awards
- 36.7% funded

NH/PI
- 47 proposals
- 14 awards
- 29.8% funded
Percentage of All Proposals versus Relative Funding Rate in Each Directorate, 2013–2016

Multi-Year Average Relative Funding Rate for All Proposals in Directorate by PI Race & Ethnicity
Academic Currency is not generated from a level playing field

Meta-Research: Systemic racial disparities in funding rates at the National Science Foundation

Christine Yifeng Chen, Sara S Kahanamoku, Aradhna Tripathi, Rosanna A Alegado, Vernon R Morris, Karen Andrade, Justin Hosbey
Where to find support
AIP TEAM-UP

• The AIP National Task Force to Elevate African American Representation in Undergraduate Physics & Astronomy (TEAM-UP)

• [https://www.aip.org/diversity-initiatives/team-up-task-force](https://www.aip.org/diversity-initiatives/team-up-task-force)
Report on the Conference for Enhancing Undergraduate Physics Programs at Hispanic-Serving Institutions

National Society of Hispanic Physicists

American Association of Physics Teachers

2018
Día de la Física/Day of Physics

- Created by the National Society of Hispanic Physicists (NSHP)
  - Aligned with the national SACNAS conference
- University of Texas, San Antonio and Southwest Research Institute (SwRI) (2014)
- University of California, Irvine (2016)
- University of Utah (2017)
- Southwest Research Institute (SwRI) (2018)
- Hawaii 2019
- Puerto Rico 2022
- Portland, OR October 2023
Día de la Física/Day of Physics

• Create a sense of community for Latinx/Chicanx and Indigenous populations in physics and the space sciences
• Foster networking for students and mentors
• Expose students to cutting edge research via scientific talks, lab tours, and professional mentors
• Provide professional development training
Día de la Física: SwRI 2018
Día de la Física: Hawaii 2019
Culture vs. STEM:
Thirty Meter Telescope
Hawaii Mauna Kea
Thank you!

Questions?

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