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### Quantitative Data

This section reflects the results from one teacher's classroom over 12+ years, and was last updated on 6/2022. We are beginning the process of collecting data from more classrooms; you can contribute by visiting the ["Connecting with our Community" page](#) on our website or by following the instructions [here](#).

- In 12 years of anonymous post-unit surveys, 95.8% of students said that this unit was worthwhile (n = 389) and 4.2% have said that it was not worthwhile (n = 17)
- In 10 years of data collection, which focused this unit on race, anonymous pre- and post- surveys of student beliefs (n = 355) showed the following normalized gains as a result of this unit:
  - ☐ + 0.93 in agreement with "I can name a black physicist"
  - ☐ + 0.65 in agreement with "I have racial biases that operate on a less conscious level than my actions"
  - ☐ + 0.40 in disagreement with "talking about race is bad because it keeps us from being colorblind"
- In six years of data collection in the same class, anonymous pre- and post-surveys of student agreement with identity statements showed the following normalized gains as a result of this unit:

Among all students (n = 237):

- ☐ +0.29 in agreement with "I can say what I'm really thinking in conversations about race"
- ☐ +0.46 in agreement with "I can succeed in physics"

Among students who self-identified as white (n = 160)

- ☐ +0.24 in agreement with "I can say what I'm really thinking in conversations about race"
- ☐ +0.30 in agreement with "I can succeed in physics"

Among students who self-identified as students of color (n = 82)

- ❑ +0.43 in agreement with “I can say what I’m really thinking in conversations about race”
  - ❑ +0.48 in agreement with “I can succeed in physics”
  - ❑ Also of note: +14% (on a 1-5 scale) in degree of identification with “my physics teacher sees me as a physics person”
- In four years of data collection, anonymous pre- and post-surveys showed the following change in students’ emotions associated with talking about race (n = 188):
    - ❑ -12.8% feeling “confused”
    - ❑ -7.6% feeling “indifferent”
    - ❑ -5.0% feeling “afraid”
    - ❑ -3.6% feeling “judgemental”
    - ❑ +9.3% feeling “open”
    - ❑ +2.2% feeling “interested”
    - ❑ +6.7% feeling “positive”
    - ❑ +17.7% feeling “strong”
    - ❑ +15.6% feeling “inspired”

### Student Testimonials

From students from under-represented identities:

- “Our Physics in Society unit this spring emulated exactly what I hope every student can experience some time during their [high school] career. I had never experienced a unit quite like it before and truly believe that it was the most enriching experience I have ever had in any of my [high school] classes, let alone in a science class... I absolutely loved how informative and evidence-based our discussions were.” So thanks to everyone for working so hard on these lessons!”
- “I wanted to say thank you so much for teaching this unit, I know it might not mean as much to some people but it means the world to me. Its what I love and hate learning so much because it sucks to look at factors that directly impact my life, but I hope this helps to bring good conversation. I can’t say thank you enough, thank you thank you thank you.”
- “It made me feel like more people stood in unity with me and my beliefs or understood my view points.”
- “I’m in my senior year at Pomona College right now, about to graduate with a major in physics. I think I’m going to take some time on and then go to graduate school in electrical engineering. I’ve been doing a lot of thinking about my experience in the sciences at [high school] and at pomona and I really want to get

my professors to include a week of discussion about race and gender in physics in the senior seminar curriculum. I think it would be good for this department to be more aware that it is all white and predominantly male and to talk about why this has happened.”

- “I just want to let you know that as a student of color, who felt very lost and sometimes alone due to my skin color in high school, it is incredibly heart rendering to know how much you are really teaching students in your class. Race can be a very touchy subject, which I was always [aware of] throughout my time as a facilitator at [high school]. Thank you [teacher]. You are truly touching many more lives than you think just by creating a safe place for such a delicate subject to be discussed. I consider myself blessed to have had you as a teacher.”
- “It was very meaningful and makes me feel more like I can take on Physics!”

Unsolicited responses from alumni after their former instructor was criticized for using the URC:

- I really enjoyed listening to your presentation and think it's great that your lesson on institutionalized racism in physics is getting so much publicity! I really think that it is an important topic to talk about and am glad that we spent some time talking about it in class. I'm actually taking physics this quarter at [college] and feel that [this class] gave me the tools to solve more difficult problems and has helped me succeed in the class. Your class was very influential to me and I am now strongly considering majoring in physics.
- Thank you for going beyond the norm and bringing issues about race, class, privilege and general social awareness to light. We so desperately need to be discussing these topics!
- Incidentally, I had never felt the social justice-themed unit to be out of place in the physics classroom and it was fascinating to me to hear so many opinions about that not being the right forum, or else that other physics teachers fear they could not bring up the type of emotionally-charged issues that you had us engage with.
- Seeing all of this criticism really made me upset. Not only are you, in my opinion, the best teacher I have had, but what you value as important in the curriculum is so beyond amazing and was extremely important. Though I personally had a lot of background knowledge on the unit, so many students did not, which is why it was so phenomenal to see it being talked about in the classroom setting. I think everyone took something positive away from your class, whether it be directly related to physics or not. I truly appreciate you as a teacher and human being, and that was the greatest unit, and overall class I ever had at [school]. I hope this

doesn't sway you in the slightest, and I hope more teachers follow your lead. I am very proud to have called you my teacher.

- For those of you stating that a physics class is a place solely for the study of physics and a few hours of class time cannot be “wasted”, I believe you have a gross misunderstanding of the pervasiveness of race and privilege in every school and every classroom in America. These aren't issues that vanish when you walk through the door of an academic institution, the shape every interaction and each student's learning experience, for better or worse. Discussing race and privilege in [teacher]'s class has enlightening an entirely new way of thinking amongst his students. If you were only able to discuss the impacts of these discussions with his students, you would then realize how incredibly respected he is as a teacher and how though provoking and imperative these dialogs are.

“What would you tell someone who said this conversation didn't belong in a physics class?”

- “There's really no class that would be “better” to talk about it in, and race in physics are intertwined when you look at the statistics.”
- “It does relate to what we learn. By discussing it in physics, we are able to connect what we have learned to other things in ‘real life.’ By learning about it, I feel less discouraged from perhaps pursuing a course in math or science.”
- “I think it's natural to think this at first. After taking a look at evidence, for me, I think physics is a fitting place to talk about race because the racial under/over representations in the field are emblematic of STEM and academia as a whole. These disparities are important to talk about, and I think as physicists taking this class, there are many actions we can take to work towards physics being more just.”
- “Physics is the study of how the world works. That study would be incomplete if it didn't take systemic barriers based on race, ethnicity, or gender. Those barriers influence the way the world works as much as textbook physics does.”
- “With the knowledge I've gained from this unit, I would explain to them the importance of diversity in physics and taking privilege to level the playing fields. “
- “I would tell them that they are lucky that they do not have to worry about how their race impacts them.”
- “It's important that students who are averse to subjects that are more likely to discuss issues of social justice be culturally competent. It's ridiculous to provide only a subset of the student population with the responsibility to be socially aware while those who are interested in science classes can use their academic interests as an excuse to be ignorant.”

- “If you were to ask me in 5 years what I had learned from physics class, this unit would most likely be the most memorable and most important to my life.”
- “We have learned a lot of physics, and students may never learn about this again in their lives. In order for them to be physicists and for the better of the scientific and therefore world community, we have got to learn about representation so we can get more ideas out there!! And solve more problems! And help more people through science!”
- “I would say that it affects whether someone pursues physics or not. Thus, it is a physics teacher's responsibility to promote racial equality in physics.”
- “Social Justice applies to everyone, everywhere, at any time.”

### Teacher Testimonials

“Last year I taught a physics class that was a majority-young women, and they all expressed in their final reflections that the unit really resonated with them as people who were looking toward a career in the sciences.”

“Even though I've only been working for one day now, already I've received three separate emails from students thanking me for starting this conversation. Our school newspaper wrote some very hard-hitting articles last year about what it is like to be a black student in our school, and students are excited to see that someone is taking a stand to open a space for that conversation.”

“Students say, ‘Wow—I've never really thought about things this way before.’...Students send me articles and videos that related to our discussions—showing that they've been investigating this further on their own out of their own desire.

“Conversations with students are now much more open, and there is a different feel to conversations had about identity in my classes. Kids have a language to talk about what they observe in a way that felt stilted and scary before.”

“[I've seen] students pushing each other to use more inclusive language. Students recognizing heteronormativity, gender bias, white privilege, lack of representation on their own in videos or readings that we cover in class. Students getting worked up!”

“Other successes I have had included getting women to finish the physics classes and sequence and getting a few women to attend the Women in Physics Conference.”

“I've had student tell me how much they enjoyed the conversations and how it opened their eyes.”

“[I've had] improved success among [racial] minority students; greater awareness of the white preference systems in the schools; direct challenges to institutional racism.

### Family Testimonials

“During my senior year of high school, my AP German teacher took a week out of our busy year to tell us an extremely personal story about her own experience as a concentration camp survivor. It was obviously painful for her, and some parents objected to the graphic and tragic nature of the week's topic. But it was a set of lessons that shaped me and still impact me more than 30 years later. Thanks for caring about the social as well as the academic development of my kids, and thanks for being courageous in broaching this difficult subject matter in class.”

“I have to say that one of the most highly engaged weeks [my high school student] had in any class while at [school] was the week you used this curriculum. I think I emailed you that week that he came home and talked at length with us at dinner about the inequities in our own city and about race relations in education. He was totally fired up and the consciousness it raised in him made his Race Relationship class at [college] this fall one of his favorites”

From a conservative parent at a predominantly liberal private high school and former Head of the Board of Trustees at that school:

“I am a public school educated moderate Republican who grew up in the white suburbs of [city]. I was fortunate enough to send my boys to [school] where they got a great education from folks like you who teach your course work but do it outside the box. The exposure they got to that thinking will help them every day of their lives. Thank you for what you are doing and how you are doing it. You have my full support.”