

There are approaches to URC implementation that work well in all contexts, but the way the URC emphasizes the relationship between systemic structures and social identities means that the "right" way to implement the URC depends greatly on the identities of your students and the identities of the instructor. For that reason, there is no one way to teach the URC that's right in all settings: instead, educators need to be thoughtful about how to modify for their context. In this document, two experienced URC facilitators reflect on how their unique contexts and identities influence their implementation - with more perspectives to come as we add to this document.

Use these links to jump down to the personal narrative:

- [A 1st-generation Filipino American teacher teaching about structural bias in physics culture](#)
 - [A white teacher teaching about systemic racism to mostly \(not not all\) white students](#)
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Johan Tabora, a 45-year old male, cis-gender, 1st-generation Filipino American physics teacher, teaches the URC at a selective enrollment public high school in a large urban area in the Midwest. His students come from across the city and span the socioeconomic spectrum. They are mostly white, Latinx, Asian, and about 14% who identify as "other" and around 5% Black.. He teaches 9th-grade physics and AP Physics and implements the URC in both in different formats. His experiences as an immigrant, a former graduate student in engineering physics, and a current doctoral student in science education shape how he teaches the URC.

How I teach the URC is shaped by all my experiences as an immigrant who did graduate physics research and saw himself as a research scientist, but who found his calling as an educator. I immigrated as a 20-year old eager to pursue my dream of being a scientist. Undergrad was mostly enjoyable and consisted of taking classes and doing a bit of research as a side job. I even landed a coveted fellowship doing orbital mechanics work at a NASA facility. It was also the first time I noticed that I was perceived differently. Everyone who was a US citizen had a certain colored badge and everyone else had a different color. There were also certain places I wasn't allowed to go to. I'm certain there were sensible reasons for all that, but it started my awareness of how people were categorized and othered.

My youth painted a rosy picture of the United States. Growing up in a former US colony blinded me to the actual goings on. Because of colonial education and the myth of "American benevolence", the Philippine education system was modeled after the US to create loyal colonial subjects. Everything (most things maybe) I learned about the US was positive. The land of opportunity. Work hard and you'll make it. Everyone is equal. Racism is dead.

Graduate school opened my eyes to the nature of physics and science. The people were nice enough, friendly and collegial...individually. But collectively, when we would have seminars or research group meetings, the vibe was completely different. It felt cold, isolating, and intimidating. I dreaded being called on, or worse, having to present my work. I wondered if I tried harder or worked more (I thought going into the lab after dinner on weekdays was the norm!!!) that somehow my talent and capacity to

do physics would somehow appear and I finally would feel that I belong. But these abilities didn't show up. I failed my qualifying exams twice and had to find a different path. I've heard people tell me "things happen for a reason" or "when one door closes, another opens" to make me feel better about my experiences and to a great extent, I do believe them. This "failure" led me down this path that has allowed me to unpack my experiences.

Filipinx's have an interesting psyche vis á vis America. Scholars refer to this mindset as a colonial mentality that manifests as an uncritical adoration for anything American. A central part of having this mentality is accepting the inferiority of our indigenous Filipinx culture, embracing and emulating anything American, and assimilating into American culture. That this mentality is a well-documented and researched concept among Filipinx's and Filipinx Americans is a testament to the success of the American (and if we're being completely accurate, the Spanish) colonial education projects that spanned over four centuries.

So I consider graduate school not so much a failure but a rupture in my science identity exacerbated by my colonial mentality. I was intimidated by being surrounded by white physicists. Part of my self-denigration resulted from not seeing positive Filipinx role models in physics. One only has to google "physics" to see why. And so this led me to see the similarities between physics and the Spanish and American colonial projects in their efforts to create a culture. It purports to be cultureless to mask its objectivity but in reality, it very much has a culture that is shaped by its practitioners. It cries "everyone can make it" or "just work harder" but its very nature makes it inaccessible to certain peoples. I do not think physicists have a malicious intent of excluding people and that reflects the pernicious nature of its culture. That physics sees its culture and therefore its population as normal. That having a token Black, or Asian, or female physicist is enough to check off the equity and inclusion boxes. That I have to google "Filipino physicist" to find physicists like me.

These narratives serve as a backdrop for why I teach the URC. I often ask myself what my role as a physics teacher is. Had one asked me early in my career, my role was to show students the beauty of how the natural world works. But I also sensed this role changing over time. As I learned more about the racial and socio-political issues happening around me, I found myself wanting to incorporate more of these issues into my classes. And the more I learned about these issues, the more I saw myself as a cog in a racist system that perpetuates social inequities and injustices. I discovered that it's a system that continues to fail Black and brown students. It's a system that says physicists are white males, that Asians are the model minority, and that Filipinx-Americans wanting to do science should pursue nursing. So I teach the URC as my way of fighting back to help dismantle the system.

Teaching physics as a neutral and cultureless entity masks the inequities it perpetuates. Richard Schull, in his foreword to Paulo Freire's *Pedagogy of the Oppressed*, captures why I teach the URC.

There is no such thing as a *neutral* educational process. Education either functions as an instrument which is used to facilitate the integration of the younger generation into the logic of the present system and bring about conformity, or it becomes the "practice of freedom," the

means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world.

So much of why I teach the URC is geared towards my Black, Southeast Asian, Latinx students, many of whom love science and haven't given up on it despite the fact that they don't see themselves represented in the general scientific community. I'd like them to be able to critically see the world and the URC helps me facilitate this. I often ask myself, "Do they really know what they're going into?" Many of my students already feel the effects of systemic injustices. A few have families who face financial hardships. A few have to take care of their siblings because their parents work multiple jobs. A few have to work to support their families. And a few have lost a loved one to gun violence. Many of them have experienced hardships I haven't and this sometimes makes me feel inauthentic and irrelevant when I teach them about systemic oppression.

As a Filipino American in physics, I consider myself a nepantlero. Scholar, feminist, and poet Gloria Anzaldua describes nepantla as a liminal space, where one finds themselves in between two worlds and belonging to neither one. For me those are the worlds of a Filipinx American and physics. I belong fully in neither as there are few Filipinx/Filipinx Americans in physics. Science educators Nancy Brickhouse and William Stanley posit that "Western Modern Science" (WMS) is a Eurocentric, individualistic, skills- and knowledge-driven field that has rigid views of what science constitutes and should be. What results is a gatekeeping practice, as educator Lisa Delpit claims, that leaves out students who do not or cannot assimilate into the culture of science. And I imagine that many of my Black, Southeast Asian, Latinx students are in positions where they find themselves left out of science. Many of my students, like me are nepantlerx, wanting to be in science but finding themselves in the space between their ethnic identity and science.

So these ideas and theorizations drive my pedagogy. As an example, I love starting with the "Subjectivity in Science" lesson because it is low-stakes in the sense that my students have already formed opinions on them, and it does not delve into personal issues like racism or sexism. Furthermore, the lesson positions physics as a field that is shaped by its practitioners and therefore not objective. This lesson always amazes me because it indicates the level of nuance young people have. When I posit if physics is objective or subjective, their first reaction is "are you talking about physics the subject or the topic?" which to me points to an understanding of and differentiation between physics as a practice and physics as the set of laws describing nature. I present them with alternative conceptions of nature and one example I love is [Blackfoot Physics](#) by David Peat. The book explains how Western science and indigenous science are seemingly congruous despite having different worldviews. I position it in parallel with Western science and this gives my students the idea that there are other valid ways of knowing. Time permitting, I present them journal articles by [Megan Bang](#), a science educator who speaks extensively about the need to desettle normative modes of science.

The URC serves as a tool for a higher calling...that we, colonized people in our various ways, living in nepantla, can know and critically assess science, and begin to move the needle towards the change that validates all people and all forms of knowing. Along the way, as I continue to teach these lessons, it has been a source of healing, a source of "coming to grips" with my identity as a Filipinx American in

physics. I continually learn from my students and this shapes how I, in turn, teach them. Author and educator bell hooks captures my sentiment when she said “I longed passionately to teach differently from the way I had been taught in high school.” I want to teach physics in a way that does not alienate students’ ways of knowing. I want to equip my non-white students with the knowledge that will help them face the realities of going into science as a non-white person. I want them to know that so much of what happens in science today is driven by the cultural majority, and that they can change this over time. I want them to learn about their own identities and how these position them in the world and in science. I want them to question the ideals science purports to be, meritocratic and objective, and see how subjectivity and systemic structures like racism, sexism shape the very nature of science.

I cannot force students to take the actions I deem necessary. That depends on the volition they develop upon learning the lessons I teach. But at the very least I give them that window to peek in and see how science works. My hope is that this gives them the agency, as Richard Schaul says, “to deal critically and creatively with reality and discover how to participate in the transformation of their world.”

Moses Rifkin, a 41-year old white cis-gender Jewish male physics teacher, teaches the URC in a private college prep high school in the Pacific Northwest. His students are juniors and seniors, many (but not all) of whom come from families with significant wealth. His classes are roughly 50% male and 50% female (students do rarely identify in other ways), with white students constituting roughly 65% of his class and students of color roughly 35%.

I didn’t realize that I was white until I was 18. OK, that’s a little glib - I didn’t realize that my white racial identity was something that had affected me and how I saw the world until I attended a screening of *The Color of Fear*. In this documentary, eight men from various racial identities talk about their racialized experience. David, a white man, makes the audience alternatively cringe and laugh at him as he blunders through stereotypes and ignorance. I could see how much David had to learn - and at this distance, I could see myself in David and how much I had in common with him. It was uncomfortable, but it motivated me to start learning more.

At the time, I felt shocked and surprised that nobody had helped me see this earlier. When I became a teacher, I kept thinking about this: now that I was in a position to educate young people, how could I help them to learn about their racial privilege earlier? And how did that work since I was teaching physics?

I share this because my orientation to teaching the URC started with thinking about my students with racial privilege. That I was teaching at a private school only heightened my feelings of wanting to help my students see their blind spots.

I’m writing this in September of 2020. That seems significant to me because, in the 15 years since I started teaching the URC, my orientation to it and to my own racial identity has evolved as I’ve learned more, as what students do and don’t know about systemic racism has changed, and as the national

conversation has shifted. In this writing, I hope to articulate some of what I've learned for other teachers who have privileged identities and are teaching in schools where most of their students do, too. If you're reading this much after I wrote it, I'm probably thinking slightly (or significantly) different things, but hopefully these writings are still relevant to you.

In my experience, so much of the dialogue around culturally relevant or inclusive pedagogy focuses on its benefit to marginalized students. So it was a slightly unique experience for me to be focusing on what the URC could do for my white students. (If something seems wrong about that sentence to you, I'll come back to that later.) I felt clear, though, that talking about systemic racism in science benefitted all students: students who might be the targets of that racism, yes, but also the students with racial privilege whose science education was reinforcing their blind spots about how that same system was affecting them. I was excited about how underrepresentation could be a mirror through which white people could learn about things we were generally being taught not to see, as well as gaining a more accurate picture of the field (there are plenty of amazing BIPOC scientists who should be a part of the narrative we learn!). I deeply believe that working for racial justice benefits everyone.

Talking about racial privilege and oppression with mostly white students has unique challenges. Primarily, these conversations are often new and unfamiliar: in my experience, white students have much less experience thinking of their experience as racialized than BIPOC students do, and so come to these conversations less equipped to speak wisely from the "I" perspective.. As a facilitator, I try to normalize this; I cannot and do not feel frustrated with those white students for not knowing what they've never been taught to know. (Remembering my own experience as an 18 year-old is really helpful here.)

It's helped me a lot to read white authors who write about the jarring experience that white people experience in conversations about race (I'm thinking of [Robin DiAngelo](#) and [Tim Wise](#) and [Gary Howard](#) here, among others.) Very few people like to be wrong - something I know well from my everyday experiences as a science teacher - and for well-intentioned white people, the worst thing in the world is to be shown to be ignorant or hurtful when it comes to race. So much of my facilitation for these students involves trying to create situations and mindsets in which these students will take the risk of participating. Helping them to set intentions, recognizing that their lack of comfort isn't their fault, making clear that none of this is meant to make them feel guilty: these are all steps that I have found help scared students to step into conversation with the goal of learning and improving. In my experience my white students are more open to this challenge than resistant, and very nearly unanimous in saying afterwards that they found this experience worthwhile and powerful.

One other step that I find particularly useful with mostly white students is to make sure the conversation is personal. In my experience, one way students avoid discomfort is to intellectualize and to talk about problems elsewhere; as a facilitator, I try to guide them back to thinking about how these topics make them *feel*, how they have impacted *their* schools and classes and communities and lives. I do so with love and an understanding that too much discomfort hinders learning - and as a white learner myself, perhaps I'm more able to put myself in their shoes than someone with a different identity might be - but one way I manifest that love is to insist that they grow and do better.

I mentioned earlier that there was a problem, though, that I'd return to. I mentioned earlier that I was focused on creating experiences for my white students to learn about what they had been taught not to see...but what was that like for my students of color? When I asked my students to identify places where white privilege had shaped their science education, for example, how must that have felt for the students who had never experienced white privilege. I feel shame and frustration when I realize that, for many years, my eagerness to help white students see their blind spots was, in fact, evidence of a gigantic blind spot for myself; I can see now that I upheld and strengthened the very systems of racism in physics that I was trying to undermine.

I feel thankful for the colleagues who helped me to see this, painful as it was, and I now recognize that I need to balance the needs of my majority-white student population with the needs of my BIPOC students. This is tricky to do, because the same discussion that meets a white student where they are may be retraumatizing for a student of color, but my students (both white and non-white) have told me that I've found the right balance. Some steps that I've added:

- I check in with my students of color before the URC begins, both by e-mail a few weeks beforehand and in person about a week before. [See [Pre-Letter to Underrepresented Students](#)] In conversation, I explain why some (not all) of our activities will focus on my white students, and ask them what sorts of things they need from me to have a good experience throughout. Sometimes they have specific requests for me, which I take care to follow through on, and sometimes the conversation simply helps to build trust that I, a white teacher talking about race in a mostly white room, see and value them.
- We set Discussion Norms each year, and I draw a distinction there between feeling uncomfortable and feeling unsafe. In my experience conversations about race can make white students feel uncomfortable, which generates learning and is therefore a great outcome...but facilitators need to make sure that no students, especially students of color, feel unsafe and unable to learn. Creating norms that allow for people to pass also reduces the chances that students of color in a mostly-white room will be asked to speak for all people of color; some years, I might name that possibility directly and explain why it's not appropriate.
- My URC implementation creates opportunities for my white students to explore new ideas, and sometimes that creates moments of microaggression (or macroaggression). In my experience, these arise more out of ignorance than malice - but as a facilitator, I absolutely must act. If what was said suggests bias discrimination, I acknowledge that immediately. I've found it useful to separate the comment ("that comment sounds homophobic to me") from the person ("you sound homophobic"), and to address it in a way that preserves the humanity of the person and the value of risk-taking while taking a strong anti-bias stance. You can follow up with the student outside of class, too, but it is critical for all other students to see you address it in the moment. [These resources](#) offer more information and guidance.
- The URC has, at its core, the fact that certain populations are not present in science to the degree that their population would suggest is fair. I think it's crucial that, as facilitators, we talk

about these minoritized populations like they deserve to be there, like the problem is with the field and not those individuals, and avoid talking about them like they are the “other”. The students in our classes who share identities with those populations, who likely already feel unwelcome in our classes, are listening. [I also want to say that I don’t think this suggestion contradicts the URC’s central value of allowing students to come to their own viewpoints: I’m talking more about tone and word choice than about telling students how to think.]

- I use extensive anonymous pre- and post-URC student surveys to examine its impact on my students and what the experience was like for them. I intentionally invite students to identify their race (or races - students may have multiple racial identities) and disaggregate my analysis afterwards by race so that I can make sure that the URC is landing well with students of color. To not do this with a majority-white student body would be to erase the experiences of my students of color. Happily, the URC impacts and experiences for my students of color are just as positive, or more positive, than for my white students.

My mostly-white student body have mostly-white families, and if anything their age and their wealth mean they might be more skeptical of the URC than their students. I think communicating with families ahead of time is always a good practice [see [Pre-Letter to Families](#)]. When communicating with my unique group of families, I tend to emphasize the practical values of the URC - that colleges and employers now say that being able to talk about race and work in diverse groups are important skills to gain, and how even students who go on to major in physics have told me years later that they valued this unit - more than its moral value...but I also think it’s important to do the latter. Like their students, I find many more families are excited about this work than critical: I’ve hosted several parent/guardian evenings in which they experience [Lesson 2 - Implicit Bias](#) and the response has been overwhelmingly enthusiastic..

Finally, the URC ends with students taking action. This is important for all students, but with students that have various forms of privilege, I make sure to explore how those advantages can be used to undo the systems that grant them. [Research on the URC](#) has shown that students in different contexts identify different actions, as they should, and I think helping my students to take action from their relative privilege is an important step that’s unique to my context. As Peggy Macintosh writes in *Unpacking the Invisible Knapsack*, “having described [white privilege], what will I do to lessen or end it?”