



Virtual Workshop May 26, 2020. Participant Responses collected May 26-June 9.

Executive Summary of Participant Comments on the Workshop Survey

Thanks to everyone for all of your responses and tips! Here, we summarize the overarching themes from the survey responses. We also encourage you to read the original comments, which are included after the summary.

Resonating with many of you was part of our motivation for the workshop—namely, the importance of viewing our current circumstances through the lens of our eugenics past, and recognizing that that past is not so long ago. One participant, for example, emphasized “how important it is in this time where genetics research is being misapplied in deliberately hurtful ways, to arm students at all levels with this information.” While our pedagogical motivations may be clear, many of you expressed the concern that incorporating the topic of eugenics into a syllabus, particularly for a biology course, is not an easy task. Perhaps the most commonly described obstacle is a fear of the discomfort that may accompany discussions of the ideas of eugenics and white supremacy. White academics, in particular, appear to be scared of “doing damage” and appearing “insensitive,” while others expressed fear that they lack the qualifications to discuss history or ethics. Depending on your particular topic, these discussions can feel remote from primary course content. As one of you put it, “there’s a world of difference between forced sterilization and rescuing the American Chestnut with transgenics.” A similar concern was that students might not be able to relate to “old” history and that perhaps focusing on current events might resonate better with students. Lastly, there was the concern that by taking time to cover either the history of eugenics or the social, political, and ethical aspects of genetics we will have to sacrifice time spent on primary course content.

Many of you offered useful strategies to mitigate these concerns. A common theme was to pursue local history, either geographically or even of your own institution (e.g., by examining old course catalogs as described in [Rori Rohlf’s recent post at Genes to Genomes](#)). As one of you put it, “[the workshop] has inspired me to start looking into my own institution’s history...as a way of drawing students into the topic.” Another common theme was to recruit and involve faculty members from other disciplines and departments, including the humanities, such as sociologists, anthropologists, historians, or philosophers. These two strategies can sometimes be combined; for example, one of you reported involving an historian to focus on the history of a state’s sterilization program. Other proposed strategies included exposing science students to anti-racist/anti-eugenics writings authored by scientists to which students might better relate, or offering examples of case-study approaches, such as asking students to find and examine mischaracterizations of genetics in the popular press, or asking students to identify an example of genetic technology and examine potential impacts on our society.

Acknowledging that these conversations with students can be both difficult and deeply personal, many participants commented how essential it is to set the appropriate tone and expectations at the beginning of a class or module, and in the syllabus, in order to create an inclusive and respectful space for students. Whether you prefer the concepts of “safe space” or “brave space,” many of you noted the importance of explicitly mentioning ground rules or “guard rails” for discussion at the outset, including, but not limited to, acknowledging that these discussions

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are difficult; that we are all implicitly biased; that we make mistakes and will sometimes fail to use the right words; and that it is important to practice active listening, give peers the latitude to find the right words, and start by assuming the best of intentions on the part of peers. Several of you also mentioned the importance of instructors modeling these behaviors and also making sure students have actively reflected (e.g., by reading and writing) prior to engaging in discussion.

Resounding throughout your comments is the message that as geneticists we all have a crucial role to play in making sure the next generation is informed about eugenics, both for those who go on to become scientists and those who do not. The impacts of your effort can of course be local, as in your own teaching, but can also be broadened by developing resources and best practices for educators at all levels, pushing for inclusion of eugenics in curricula, fostering interdisciplinary conversations on eugenics between scientists and humanists, highlighting ethical concerns from more recent studies (e.g., GWAS studies trying to link SNPs with poverty) and organizing events that highlight the issues surrounding eugenics, particularly in contexts that will reach those less familiar, just to name a few strategies. Our hope is that any and all of these efforts can serve as a check against the future misappropriation and misuse of our science.

We look forward to your continued interest and work in the field, and a larger “woke” genetics community in which teaching eugenics history in genetics is as commonplace as teaching Punnett squares.

—The Workshop Organizers and Panelists:

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All participant responses to the Workshop Survey can be found on the indicated pages:

1. What perspectives and approaches discussed during the panel resonated most with you?

Pages 1-4

2. Do you already address the topic of eugenics in your classroom? If so, what approaches have you found most helpful? If not, are there specific barriers that you've encountered?

Pages 5-9

3. What strategies have you found effective for creating inclusive and respectful discussion on controversial topics? **Pages 10-13**

4. We are hoping this workshop is a first step towards action items that can be undertaken individually or, perhaps, in small groups. What role can we as geneticists play in increasing awareness about the history of eugenics, and fostering civil discourse about the promises and perils of new genetic technologies? **Pages 14-18**

5. Other thoughts you'd like to share? **Pages 19-21**



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1. What perspectives and approaches discussed during the panel resonated most with you? 40 responses

1. Setting the tone and expectations before the lecture and discussions. Working with colleagues in humanities departments.
2. I really appreciated the opportunity to share resources and lesson plans. I also found the approaches presented that used immediate connections for students to be very compelling (e.g. Bryn Mawr's history with eugenics). It has inspired me to start looking into my own institutions history with the topic as a way of drawing students into the topic.
3. I loved the examples where instructors shared their own genetic information and experiences with discussing sensitive issues.
4. What resonated most with me was the approaches to setting a tone that will enable students to deal with the atrocities done in the name of eugenics.
5. Gdavis, speaking from a specific community, Michele, and the body odor SNP - brilliant, I want to explore its use, JNovembre, OMG thank you for caring enough to bring this in to the graduate ethics course and practice,
6. It was really useful to see how eugenics was incorporated into two styles of undergraduate genetics courses.
7. i learns lots of basic things related with genetics.
8. Adding a history lecture "hidden" in the SNP lecture is brilliant. Also, I really want to make all of my students feel included, so I hope including eugenics history material will elicit that response.
9. The ideas linking history with current events
10. Personal examples of genetic variation, ie earwax/body odor snip as a selectable disorder.
11. I love the idea of partnering with a historian or philosopher to teach the context behind genetics. It also made a lot of sense to me when it was brought up that students tend to underestimate the difficulty of certain college classes. I've definitely experienced that before, leading to students' anger when they had to put more effort into the class. I might start incorporating an assumption check like that at the beginning of my classes.
12. I appreciated seeing different examples of how eugenics has been woven into different classes. I found the idea of researching primary literature from the 1920s or studying



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scientific conferences on eugenics to be particularly useful for my own teaching. I also very much appreciated the case study examples and the resources posted in the comments. Overall, I think the messages that this can be done at many different levels and to varying depths to be useful. In my own teaching, I dig into the issues of eugenics (both in the past and present) to varying degrees in different classes and find different depths appropriate for these different groups of students.

13. I really like the approach of defining upfront that as we have difficult discussions we will all make mistakes and say things that maybe we don't mean as we hone our language . It is a great idea to both encourage and model that humility in the class.

14. Michele Markstein"s and Dr Davis approaches have been good

15. The overall thing that resonated most with me is how important it is in this time where genetics research is being misapplied in deliberately hurtful ways, to arm students at all levels with this information. It seems that how the lessons are set up are very important, so I am grateful for the resources that were discussed, the risks and student responses, and the additional comments and sources shared in the chat window. I hope that the information that is sent out to attendees after can collate some of these resources (Websites, Books, Primary lit., Popular press) for us.

16. The shock that eugenics sterilization was still being performed in the 1970s.

17. How to integrate genetics and history in a science course. Talking about ethics

18. I am most interested in engaging students with the ethical dilemmas presented by new genetic technologies by revisiting issues from the past.

19. I love the idea of integrating with history; I never thought of "giving up" a lecture before due to trying to keep all my content. But now I know it is worth considering.

20. Everything was great. Liked that there were "teachers" from different levels.

21. Michelle's two specific examples of how she presents case studies in the classroom were both helpful.

22. I liked Dr. Markstein's suggestions for sneaking in a lot of the concepts with a nuanced discussion of the "removal of a SNP" from the population. I also fully agree that ethical issues should be discussed more, especially at the graduate level (especially as so many students from these programs go on to work for biotech companies).

23. the idea that we need to establish expectations for the course & how we will interact with the material -- reveal a bit more about our approach, be transparent & foster learning environment, rather than a 'judgement environment'

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24. I appreciated the use of an example to demonstrate that disease is subjective.
25. The mini projects which involved applying scientific publications to the discussion
26. Acknowledging that these conversations are challenging but crucial, laying ground rules for a respectful conversation, acknowledging that these ideas are actively evolving among experts, ensuring that people feel seen and safe to be who they are while at the same time exploring potentially uncomfortable ideas, pgED resources
27. Using relatively low stake examples (such as ear wax/body odor) to introduce the difficult concepts of what is "normal" and what is in need of "fixing".
28. Michele's comments - thank you for being so creative and thoughtful
29. When the panelist were frank and honest about when/how this can be difficult and personal
30. I really appreciated hearing the personal experiences & challenges for those who have taught eugenics. The delineation between different teaching contexts was helpful for me to choose my approach for the future. I was glad to see this move toward open source/popular science materials, since the landscape of genetics in both the academic and public spheres are both changing so fast.
31. Honestly, pretty much all of it. I'm always looking for ways to make sure that students understand the history of the intersection of science and society and the strong connections to important ethical quandaries.
32. Getting an expert in from another faculty was an excellent idea
33. I enjoyed this entire panel, but if I had to pick one thing it would probably be the example of using the SNP for ear wax/body odor to teach multiple points related to eugenics. I also thought the question about what traits may be even have an underlying genetic basis was extremely thought-provoking.
34. I appreciate giving a brief history of eugenics (I will be looking into this more!) and the strategies and examples of how to talk about this in the classroom.
35. I really enjoyed the exercise of odor related SNP. I like when approaches have a twist that play with our pre-conceptions about things and they end up revealing other layers of complexity and intrinsic bias.



TAGC Workshop: Raising a Woke Generation of Geneticists

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36. Really liked examples that mixed the historical information with its potential relevance in current times
37. Ideas for creating a safe space / encouraging discussion in classroom
38. The sharing that the topic is important and that even one is not comfortable with teaching of the specificity of history of eugenics this can be overcome by inviting colleagues from history or the humanities and to show films and other material that speak for itself.
39. I like the start with the present, then explore the past and future strategy.
40. I teach Biotechnology introduction and one of my lessons is about ethics, but briefly. I think it was important the encouragement you gave us to talk about. What I'm going to try is to mention the thematic and let them think for when they have genetics or other more specific classes they can address better or have this in mind.

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2. Do you already address the topic of eugenics in your classroom? If so, what approaches have you found most helpful? If not, are there specific barriers that you've encountered?^{38 responses}

1. No
2. NA
3. Yes, briefly, as part of the diversity intensive focus of the class. I have found that focusing locally (North Carolina sterilization programs) is effective.
4. my fear of screwing up and doing damage = giant barrier
5. I usually discuss it in the context of 23 and me, CRISPR of humans. The main barrier is my discomfort in discussing it.
6. WE generally have Ethics as part of the biotechnology course for Pharmacy students
7. Not yet. I am always concerned that I may say something that makes me seem insensitive, but I think being open at the start about it being a difficult topic to discuss and that we are all learning (as suggested) will help.
8. Not yet, although I do cover other ethical issues with genetics. Barriers: taking time from science content; lack of training in talking about charged topics in the classroom.
9. We discuss "Crispr babies" and the prevalence of DTC genetics
10. 300 level Genetics, have brought in CSHL photo gallery images and the are powerful, used some of Ken Burns the GENE PBS part I in my class. I used a case study in science (Buffalo) this semester different pieces of it throughout the semester, dark skin, blond hair, and then built genome browser tasks and thought questions. Can be uncomfortable conversations there. For this SNP, what do you think you have at that position? How could you know (design primers). Also use inborn error of metabolism, sweet baby case study from their collection. Ethics here, in-breeding, religion. I use primary research articles on that case study.
11. Yes, typically in my Genetics class. Breaking students into small groups works well.
12. As a postdoc I am not currently teaching but I do discuss the topic with graduate students I am mentoring. A big issue for me is that it brings out my own emotions and I have a hard time holding back my opinions which I don't want to force on my mentees.



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13. N/A

14. I have shied away from talking about eugenics directly with a whole lecture although it often comes up in discussion. As the panel mentioned, it is hard to know how to talk about these topics. Also, I am not an expert on the history of eugenics.

15. Not yet, have not had the chance to teach my own genetics course (yet)!

16. yes. I usually bring it into the conversation on day one. You don't get Mendel, Morgan, Darwin etc without Galton and the rest. We then return to it from time to time (genetic engineering unit, population genetics unit, complex traits) using examples from primary literature and popular science (GWAS studies in the news, I've also used some of the resources from PgEd). I teach a medium sized undergraduate course and I want to expand on this further. Right now we don't engage in as much student discussion as I'd like about the topics. I loved the example that Michele showed from her class and am now thinking about how I could develop something similar! thank you!

17. Not specifically, however it has come up tangentially in a course I teach about the biology of sex differentiation. We spend a lot of time in that course discussing the history of the field, particularly as it relates to human sexual differentiation, and eugenics comes up as part of that history. Side note: I use Sarah Richardson's book "Sex Itself" to structure this content - it is a fantastic book for those discussions.

18. I don't explicitly, but I strongly and consistently take a positive and at times celebratory approach to human phenotypic diversity.

19. No, but I will. One barrier was that as an undergrad I remember learning in more than one class about eugenics. But it was always taught in this weird way where we did the math to calculate allele changes, etc. All I remember was that the take-home message was that eugenics was bad because it was silly because it would have taken 10,000 generations to produce meaningful reductions in recessive alleles, or something. No one ever seemed to question to logical flaw in that argument, that being that eugenics presumably would have been acceptable if it were only more efficient.

20. I have not yet, but certainly will once I start teaching Genetics in the future.

21. I've not yet taught eugenics - I haven't taught a full genetics course.

22. Yes, but it is hard to get students to discuss uncomfortable topics. What I have found helpful is to first lecture on the history of eugenics in the context of modern human genome editing. I then assign an essay question asking students if they think it is appropriate to edit the human genome, in soma or germline, and for which traits. I explicitly state in the assignment that there is no one correct answer and that they should



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feel safe about sharing their opinion. That writing assignment seems to help foster subsequent in-class discussions.

23. NA (not teaching yet)

24. not currently teaching genetics, but have addressed the Tuskegee Study in a course on scientific literacy -- it was crucial to establish why we were delving into ethical implications of clinical studies & history of medicine... important to also have established a tight classroom community.

25. I teach an 18 person general ed discussion-based class called "genes, genomes and society" in which I rely heavily on current events/topics in the news to introduce a topic. I have struggled with eugenics because its old (read history).

26. I have addressed the topic of eugenics primarily in my upper-level undergraduate genetics course and my graduate-level genetics course. We usually have one day where we discuss the ethics of genetic engineering. Before the discussion, I provide a brief history of eugenics with material sourced primarily from The Gene book featured in the panel. This short lecture is intended to provide context as students then grapple with questions about how modern technologies (from prenatal genetic diagnoses to the possibility of CRISPR-mediated editing) should be viewed and regulated. While so far this class has been generally well-received, I think that it could be improved by incorporating more discussion within the presentation of the history of genetics, and by better setting up the ground rules for discussion, as was mentioned during the panel.

27. I have addressed these to varying extents in different classes. For introductory biology, I have found using eugenics-based pedigrees to be a good point of entrance into the topic. Similar to Michele's case study presented in the workshop, it provides an opportunity to review some of the major concepts in genetics and pedigrees while having students find flaws with the genetics presented in the pedigrees. It also then opens up the conversation a bit to how it is easy to critique the past, but we also need to keep in mind ways in which there are still dangers of misuse of genetics in the present and future. I also team taught a class called "The History of Eugenics and the Future of Genetic Testing" with a historian a couple years ago and am planning a revised version of the course next spring. As an interdisciplinary class, I think we were particularly successful in helping students from diverse disciplines build the bridges between science and societal/ethical considerations. One reading that was particularly helpful was by Dorothy Roberts book Fatal Invention. In particular, the chapter "Redefining Race in Genetic Terms" sparked thoughtful discussions about the intentions and actions of scientists. I also found: John P. Jackson and Nadine Weidman, "The Origins of Scientific Racism," The Journal of Blacks in Higher Education, No. 50 (Winter, 2005/2006) which is available on JSTOR to be a good introductory reading for students with science and non-science backgrounds.



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28. I am a student, but have really appreciated when eugenics is included in the curriculum. If it was included in high school (AP Bio), then I don't recall it being presented in an impactful manner. Eugenics was covered briefly but well in my principles of genetics course (300 level), in optional seminars that I attended, and somewhat in depth as part of an intro Ethnic Studies course (centered on US history). I'm going into a genetic counseling graduate program, and am interested to see the approach there.
29. Not eugenics, but we do touch on race-related differences in medical treatment and anatomy. Sometimes bringing the subject up can lead to uncomfortable silences.
30. I am currently a postdoc in evolutionary behavioral neuroscience (with some genetics). As a graduate student, I designed and taught a first-year writing seminar that was focused on the nature "versus" nurture debate, so we did have a discussion of eugenics and biological determinism. I definitely set ground rules before we started more sensitive discussions and I think things went well. I think one of the biggest challenges, though, is when students in science courses are not used to having "non-scientific" discussions, but I think it is so very critical.
31. Creating courses that otherwise ask students to do things like writing and analysis tasks will help this kind of lecture/discussion not to seem so out of left field.
32. No. I'm a graduate student, but I like science communication and outreach, and I think those are topics relevant to be addressed with everyone.
33. Yes. I am in Brazil and we have basic genetics taught separately for Medicine, Pharmacy and Biology students for example. In the health sciences courses I have introduced eugenics and ethics using some material from the Eugenics Office of CSH and then address modern biotechnological questions. I have also been having success with using stories from a Brazilian book from geneticist Mayana Zatz (GenEtica - Choices our grandparents did not have to do) to illustrate ethical questions. The students in group present the story theatrically (improvisations) and then the rest of the class has to think what principle is on play in the situation. And then they have to decide what they would do if in the position or criticize the attitudes that the person in the story took.
34. yes, i already read this topic in my classroom.
35. Not really. I think one of the most important barriers has been a sense of inadequacy in training on how to deal with potential ethical issues and a perception that students tend to be turned off by topics that are "old" or historical if they are not shown how it might relate to current times. I do that with many "historical" aspects of Genetics but have not felt the need, until recently, to bring eugenics per se (although I have addressed eugenics in a grad course when discussing GWAS studies on neurological conditions).



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36. I have used HHMI's Biology of Skin Color video, which addresses skin color but not all aspects of eugenics directly. I have never been confident in my ability to tackle this topic more directly. We also usually have class discussion surrounding gene editing, about "desirable" or "undesirable" traits and whether or not people should manipulate them.

37. I assign 2-3 'creative writing' assignments in my introductory genetics course. 1. Book report from a list of books dealing with eugenic/ethical issues in genetics. 2. Movie review - most often GATTACA, but some other good ones out there. 3. Open format responding to one of many possible prompts on ethical issues in genetics. We also have some eugenic discussions in class, after I present the history of eugenics in America, and discuss existing eugenic laws - which students are usually not aware of. Further TA-led discussions happen in weekly discussion section meetings.

38. For many years I assigned readings for the CSHL Eugenics Image Archive --students frequently expressed that this the first time they knew about these events. This past year I used a new PBS video on the American Eugenics Movement.

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3. What strategies have you found effective for creating inclusive and respectful discussion on controversial topics? 35 responses

1. NA
2. it is vital to lay a groundwork at the start of the course and allow students to leave the room as needed
3. be up front that convos may be challenging but are critically important
4. popular articles, newspaper articles, play on ethics of genomics "Informed Consent" about the Havasupi Indians in the Grand Canyon.
5. Example based discussions with ethics thrown in
6. Establishing that we must all be respectful of each other, but I would love to hear more specific strategies
7. Norming the classroom and coming up with common community standards.
8. Students each choose their own topic about the impact of genetic tech on society and write a review paper on that topic. Then they give a short presentation. Ideally, we then have a discussion about the presentations (did not this semester bc of covid).
9. I use a values writing assignment that Brownell and others published on a few years back early in the semester. By completing students bring their values into the classroom - their values matter and they don't need to be left at the door. One of the things this lets them know is that they don't have to agree to conform in order to matter.
10. I like to start by discussing why we are going to talk about race and genetics (or whatever topic there is) with a disclaimer about the awkwardness and possibility of language misuse. I ask for everyone to assume best intentions on the part of the speaker. After a bit of lecture, I ask students to define and discuss race, genetic variation, subpopulations, and genetic ancestry, how these terms relate or do not relate and how they can be misinterpreted.
11. Asking questions
12. N/A
13. Allowing students to participate in multiple ways - writing discussion questions/comments before class for a homework assignment, writing on index cards during class as well as



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discussion. Defining terms before beginning discussion. Grounding the discussion in real studies that have been done and real data.

14. I really appreciated the approach of being upfront and setting guidelines and "guard rails" for discussions in a classroom that will address difficult topics. I also see great value in leading by example when it comes to actively listening and leaving judgement at the door.

15. Again, lay the groundwork from day one, both in my discussion with the students and in the syllabus. Allow all students who want to speak to be heard, respectfully. Allow space for anonymous questions and comments.

16. I spend time on the first day of class discussing rules that we will all follow during our conversations. Our campus has a suggested set of rules, and I use that as a starting point. The class develops a list of rules together that everyone agrees to follow. We revisit the rules throughout the course to see if any revisions are needed as class discussions occur on difficult topics.

17. When we talk about chromosomal mutations specifically I used to get a lot of questions like "Are these offspring viable? How does anyone survive with ____ mutation!?" My response was to add in a small groups project where 20 minutes were taken for 2-4 students to research a chromosomal disorder on their phones, and try to find someone who has it (or has a family member who has it) and was blogging about it. I can't talk to the experienced of someone raising a child with Cri Du Chat's disorder, but someone can. And that can really humanize these people with dramatically different phenotypes from the people in our class.

18. We do talk a lot about race, patterns of human genetic diversity, and so on. I start off by saying that, look, it is awkward. It's awkward for me (white male). It is awkward for everyone. It was initially hard for me to acknowledge that I, as the professor in the front of the room, don't have all the answers. But it is way better than trying to pretend to be this authority on everything when I'm not.

19. I am hoping for more information on this. I am a disabled faculty member teaching at a PUI with underrepresented groups and I want to maintain a sensitive and respectful atmosphere for everyone at all time concerning eugenics.

20. I have not yet had this experience.

21. Acknowledge that we all (myself included) approach the class with a personal perspective and set of unconscious biases. We can have discussions about our ideas, but we need to respect that people can have other perspectives and we should be sensitive to that.



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22. I have found that a direct, candid, honest approach is best. I discuss the genetics /biochemistry of pigmentation, including human skin color, then segue to difficulties of making conclusions about human potential from complex genetics, GxE, and finally into lessons from modern genomics that the classic definition of race is wrong. I also discuss the evidence that we are all descended from common African ancestors, and that there is no one true wild type human genome. The URM students have reacted quite positively to a direct discussion of these topics, both within and outside the classroom.
23. NA (not teaching yet)
24. ask students to share what they expect from all of us - build expectations together, and implement anonymous feedback structure (on scratch paper at the end of a class discussion).
25. (1) Explain that there are no right/wrong answers. But we need to back up our assertions/opinions with facts. (2) emphasize that words matter. The example I use is to switch up sentences with "mutant/wild-type" vs "variant", when describing genotypes. (3) Before a discussion, I assign students which viewpoint they are to defend.
26. I try to emphasize mutual respect and the benefits of diverse perspectives. But I still feel like I have a lot to learn here.
27. Similar to many of the panelists, I think setting up the discussion with ground rules and making it clear that the topic is hard has worked okay. Having students do some free writing and or submitting writing ahead of time has helped because this gives students a chance to process and refine their thoughts before sharing. Creating inclusive spaces is still definitely something I always grapple with when discussing these topics so I appreciated hearing additional perspectives from the panelists.
28. Establishing expectations from the beginning, and emphasizing leniency in language (i.e. letting people stumble in conversation, because staying quiet doesn't help them find confidence for future discussions.) Background reading & prepping your own expectations, ethical ground-rules for discussion, etc. is helpful before coming to class - gives more space to mentally & emotionally prepare.
29. I think having the students read and do reflective writing before the discussion can also be a good idea so that the students feel more prepared for a difficult discussion. One thing that wasn't touched on a ton was perhaps giving students science-based tools for arguing against claims of biological determinism, otherwise it feels like it's science (which they like, and identify with) "versus" their personal beliefs about equality & justice (which are not science). This isn't a fair framing, in my opinion. If you're aiming for a lesson in scientific scholarship, there were a fair number of researchers who were writing powerful critiques of eugenics/biological determinism that were grounded in science, especially



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discussions about how the environment shapes phenotype (beyond merely GxE). I know the field of animal behavior/comparative psychology a bit better and this was a common theme in my training, but there were a lot of people who were thinking and writing about these topics. I personally found it heartening to read anti-racist/anti-eugenics writings from renowned scientists, including Richard Lewontin, Stephen Jay Gould, Daniel Lehrman, Ethel Tobach, and many others.

Also, one assignment that I found useful that could be adapted to other contexts was a writing assignment that asked students to find a popular press article that implied some degree of biological determinism (e.g. "Scientists have found the gene for X!"). I then asked the students to find the original journal article it was based on and write a letter to the editor of the public press piece critiquing the article and arguing about why it was problematic. I got some great essays and students were shocked at how easy it was to find articles like this to this day.

30. Working as a volunteer for 2 different science museums, I've learned that listening and understanding where people's reasoning comes from allows for a better construction of an argument and counter-argument - otherwise you are both speaking at different frequencies, and no one gets the other.

31. ensuring everyone knows it's a conversation and they will be respected

32. I have not thought specifically on this topic but the idea of using creative strategies such as improv give a relaxed environment that is very much appreciated by students.

33. speed breeding is the best way to selection of new varieties.

34. I think one of the panelist referred to it and it is the need to take the time to listen to the students opinions, provide my own but on controversial matters to not do so in a "lecturing" style.

35. Talking about ground rules for respectful discussion at the beginning of the class.

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4. We are hoping this workshop is a first step towards action items that can be undertaken individually or, perhaps, in small groups. What role can we as geneticists play in increasing awareness about the history of eugenics, and fostering civil discourse about the promises and perils of new genetic technologies? 34 responses

1. Having more workshops and resources available so we can share with other scientists and create a conversation!
2. publish resources, present information at conferences
3. Previously, this is not a topic I would consider teaching because I considered it "not science." I think that it is very important to teach because it can also help explain people's fear and distrust of the medical community. Not acknowledging these truths ignores problems and students' ability to trust other things that you are trying to teach them.
4. We as educators must make the ethical aspects clear and follow through with example as in teaching and experimentation . Raise awareness about wrong practices and be in activist mode to ward off mal practice by the Pharma community.
5. I am very appreciative of the sharing of resources to teach this topic. Having these publicly available is a great start, and if there is any pedagogical research/feedback on the effectiveness of each approach/resource to accompany would be helpful too.
6. I think this is one way of showing how marginalized groups have been treated in the past (and even recent past) and connecting that with how that is still having an impact today. Our majority students aren't usually aware of these topics and the inequities or see it as some part of a horrible past. If they aren't made aware about how this is impacting us now, they will go into the workforce and become cogs in a racist/sexist institution and unknowingly propagate these problems.
7. Teaching and training in a more nuanced and sophisticated way
8. The idea of bringing science and scientific thought into issues of social justice is interesting and so very important.
9. Including it in teaching and broader discussions whether in the classroom or at cocktail parties is a start.
10. Sharing lesson plans, news articles, and textbooks is super helpful



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11. Providing lesson packages, best practices, continued support from organizations
12. I think we really need to educate the public about what we know about genetics and what we do NOT know.
13. I think we play a huge part in making sure that our students know that they can serve as knowledge ambassadors for their communities. Once we pass on information to them and model how to have respectful discussions, we can empower them to return to their families and communities to continue these discussions and raise awareness.
14. I absolutely think its our duty to put a solid genetics education in the context of society. My students may never do another punnett's square or chi square analysis ever, but they will certainly have to deal with the consequences of genetic research as they continue their lives outside of the classroom. The more tools I can help them to be prepared with to face these situations, the better.
15. Having classroom resources available is an important step in this. I also think that creating lesson plans that very intentionally draw a connection between the early advances in understanding genetics being taken advantage of by those with political motivations and the current revolution in personalized genomics/medicine being potentially used in the same way (or used for other politically or economically motivated reasons) is critical. The parallels are quite striking, and I think that using a framework that points them out to students can be powerful.
16. I think removing the taboo on this subject in essential. It seems to have left our cultural discourse at a moment when we most need to remember our past mistakes as we swiftly approach a moment when we will be able to much more easily repeat them. Even in our discussion, no one directly addressed the field of genetic counseling. This is a field that is valuable and potentially incredibly dangerous. I think lay people with vague science backgrounds need to be part of that discourse.
17. More than ever, geneticists need to interact with the public to combat misinformation and fear of science. Sadly, science is increasingly seen as a tool to do harm to people and the history of eugenics does not help this. We need to be vocal about our moral stances against eugenics and advocate for rulings to prevent abuse of the contemporary power of genomics and gene-editing.
18. I think at least a section on this topic should be required for all Biology majors and included in non-majors courses. A recurring theme in today's discussion was acknowledging the value of having awkward conversations in the college Biology classroom, but it would be really helpful for the community to practice regular outreach on this to the whole community. This could take the form of training local high school biology teachers to include the history of eugenics in their classes. Perhaps correcting the



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omission of this topic from Genetics textbooks. Finally, for those with excellent communication skills and a strong understanding of the topic doing things like writing OP-EDs and giving interviews for press and podcasts to counter bad information.

19. Students in the sciences may often be attracted to the sciences because of the "objectivity" and promise of clear answers of right and wrong. This may start on the level of the answer on a test, but it can spiral upwards into assumptions about answers of morality and social policy. Creating spaces for conversations about the implications the of the biology we study seems really important. I would love to see more interdisciplinary courses taught that explicitly address the difficulty and at times ambiguity in knowing what to do with the information we can get from genetics. I think bringing in colleagues from across departments is an excellent way to begin training ourselves and our students how to have these discussions.

20. Public outreach talks. I gave one entitled "We are all mutants" in our local "Science Cafe" public series. In it, I tried to hit the most important basic principles of DNA and inheritance, and misconceptions, including in humans. I think most of us are hesitant to give such a talk because of the inherent pitfalls of being misunderstood (hoisted on our own petard).

21. Maybe more public-facing web-based discussions? The quarantine has really highlighted how useful online events can be, since travel is not required and they can be easily attended by more people than IRL events.

22. would love to continue these conversations, especially given that I'm very early career - and clearly have a lot to learn from experienced educators ... not sure what the best structure would be, but I think that ongoing conversations will help us all continue to learn and practice thoughtful approaches.

23. In the classroom, and when we talk to our neighbors, I think that we should emphasize that (1) not all data are equal (the design of the experiment matters) and (2) data is interpreted in a social context.

24. I think this is a great idea. Raising awareness of the importance of this topic among educators, and providing concrete resources like the lesson plans mentioned today is a great step. Reaching out to K-12 teachers with similar resources as well.

25. I like to talk about my teaching of eugenics (both in other academic contexts and in other social/professional situations). It opens some doors to discussions about why scientific literacy is important and leads to opportunities to talk about current technologies such as 23 and Me.



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26. Taking responsibility for how your work is used, especially outside of context. It's not a fun part of the job, but it's one of the most vital. Be vocal, and don't let these discussions become an "extra" activity that can easily fall off the priority list. If you do not have the time for this responsibility, support those in your department/ circles who can do this work for you, and respect this part of their contributions (to the same respect as publishing papers, etc.) Can't wait to hear more!

27. I work in plant genetics, and I find the crossovers between nativism/human eugenics and anti-GMO/organic gardening/native plants interesting. Still, there's a world of difference between forced sterilization and rescuing the American Chestnut with transgenics. It's our responsibility to educate about eugenics to help society understand how we came to our current feelings of the morality of genetic technologies.

28. I think there is still so much to be done educating ourselves. I think it would be interesting to do panels at scientific meetings which include both social scientists & biologists, together engaged in a (perhaps difficult) discussion about language and meaning, and what the two approaches have to learn from each other. This might also include advocacy groups, as well. Some colleagues and I had proposed something similar to guide a discussion sexual differentiation at the Society for Behavioral Neuroendocrinology meeting, for example. These kinds of discussions should also result in a publication, as well as the popular press coverage too. But, it has to be done in a way that makes sure that it's not just preaching to the choir and actually engages some of the people who would be more likely to opt-out if they could. I promise you that the younger trainees & students are desperate for more of this kind of stuff!

In addition, I'm involved in 500 Women Scientists, which is currently engaged in an initiative on reproductive justice (<https://500womenscientists.org/about-repro-justice>), which covers many of these issues that were a part of the eugenics movement (e.g. fertility control targeting women of color, including sterilizations). We have partnered with Jalessah Jackson, and Educational Equity & Anti-Oppression Consultant, who has put together a series of webinars on the topic for our organization because we believe that as scientist-activists, we need to be educating ourselves first and foremost. One thing that I have learned is that scientists would do well to engage more directly with communities that have been directly impacted by the history of eugenics, learn *from* them and their experiences, interrogate the role of power in previous scientific research, and think intentionally about both the histories of harm and continued distrust among historically marginalized communities. This is critical before we can start to really think about how to reduce harm moving forward. I'm super interested in these topics and I'm happy to talk about this more. I would be interested in being involved going forward.

29. I would like to see more departments promoting more debates about ethical topics like that. It would be really enriching to have people from areas in the humanities, like philosophy, anthropology and sociology, involved in those discussions. People that



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actively do research on those topics and could offer other perspectives on these discussions.

30. taking more of a public stance on unnecessary/divisive research, e.g. finding a poor gene!

31. This aspect of being critical to this "wonderful" discipline should be mandatory in curricula.

I see myself being much more pro to technology than suspicious. It is a reflection that many of us are not used to do. That is why I find very important to include this topic.

Having the chance of GSA to include this discussion among my colleagues is important.

32. small groups

33. Not a straight answer I can offer

34. We need to be ready to answer distortions in the interpretations of GWAS analysis

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5. Other thoughts you'd like to share? 32 responses

1. THANK YOU for this workshop! I would love this to become an ongoing dialog about the vitality of teaching eugenics and related topics.
2. thanks for organizing this session but the timing was problematic and I only got the link the morning of - needed to know in advance it was more than an hour long so I could schedule accordingly
3. Thank you for a great workshop!
4. Thanks. The workshop was very interesting. Despite general zoom fatigue, a good use of my time.
5. I would love lesson plans that prove a guide for a lecture on this topic as well as activities/assignments that could work.
6. Thank you very much
7. Thanks for the awesome workshop!
8. We typically use the term "trainee" to include individuals working in academia who are not faculty/staff; graduate students, postdocs, undergraduate researchers, interns, etc. Might be useful for your information gathering purposes in the future
9. I found the movie Three Identical Strangers a good starting point to talk about ethics of scientific studies about genetics. It would be really helpful if a list of good articles to assign students to read about eugenics could be posted.
10. Great panel! Will definitely be checking out the resources provided to add a module or two to a graduate RCR course in the fall. Thank you!
11. Thank you for this workshop, it was great. I look forward to seeing the useful resources that are put together for teaching this topic in the future.
12. Thank you for a wonderful and very engaging workshop! It has inspired many ideas for me that I hope to incorporate into my future courses.
13. Wonderful talk. I'm going to go watch that documentary right now. So excited!
14. Here is my request of anyone writing a textbook: Include ethics throughout. It seems every text ignores ethics during the cytogenetics, prenatal testing, pop gen, human



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evolution, race, disease mapping, etc. and then when we get to CRISPR-Cas9 they are like "... it is essential that we ensure this technology is not used for evil.", as if genetic engineering humans is the only, or even an important, area of ethical concerns.

15. Thank you for a wonderful workshop and I hope to hear more from others about teaching this difficult but necessary topic.

16. This was excellent, very rich in helpful information. Thank you to the organizers and presenters.

17. Thanks for putting the workshop together!

18. Thanks for the workshop. Good discussion and helpful resources for teaching Genetics.
Brian Calvi

19. Thanks very much for organizing and sharing! I am planning to teach in the near future and anticipate that I will incorporate eugenics history into my classroom. This have given me an idea of how to do that and what challenges I will need to consider.

20. Thanks again - learned a lot, very useful workshop that helped me 'get outside' my research a bit & think about how to communicate broader issues & finer nuances as we would with students...

21. Another book not mentioned by anyone is Kenneally (2014) The invisible history of the human race.

22. Thanks for a great workshop! I hope you will send the slides to the participants as well as the resources mentioned in the chat.

23. Thanks for the workshop! I really appreciated the new ideas!

24. THANK YOU!!

25. I thought this link was the crowdsourced ideas form.): Now I'm hoping you might resend that form to workshop participants.

26. Thanks for an interesting panel!

27. given the topic, a more diverse panel is a must

28. We live in our Country a very hard situation. A president was elected who was not hiding his ideas of rich male and white supremacy during the campaign. His speech as a deputy in 2011 is as eugenic as it can be against the poor. we need to be able to address these issues without falling inside the polarization of left and right. It is not easy. Thank you for



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the opportunity to share my ideas and experience. It was a rich experience to be in the workshop and hope to get more info from other participants.

29. It feels important to acknowledge that the "hurtful past" of America is continuous with today's hurtful present. Personally, I'm having trouble focusing on effective teaching strategies while watching parts of our current government pursue policies whose outcomes are especially lethal for brown and black folks. I am having less and less faith that changing our academic discourse about these issues will make a substantive difference when our conversation is happening in the midst of all the systemic inequality, oppression, and violence of our culture.

30. no

31. One challenge I have seen students encounter is that when I cover genomics I talked of the biases in population sampling and the need to expand to underrepresented groups. How genomics has found medications that do work better in people of particular populations. But I also tell them about how similar all humans genomes are (the skin color outlier, how if you chose another character you can group humans in different arbitrary groups). Some students struggle with what they perceive as a duality there, I think because their difficulty in understanding variability.

32. Very important and timely! Keep going!