

Unit 1 - Why Does Representation Matter?

Some students may not yet be convinced that a supposedly “objective” field like science benefits from diversity among its practitioners. The goal of this lesson is to engage in conversations about the relevance of underrepresentation in science and how a scientists’ background may influence the science they study.

NGSS connections: **Practices:** Asking Questions and Defining Problems; Analyzing and Interpreting Data; Engaging in Argument from Evidence; **CCCs:** Patterns; Cause and Effect; Systems and Systems Models.

Starting point for instructors

- Do [Unit 0 - Setting the Stage](#) before this, and review norms if needed
- This lesson builds on ideas of subjectivity and who does science. We suggest students be familiar with lessons [1-Data Analysis](#) and/or [1-Subjectivity](#) before beginning this one.
- Read about the [Fisher vs UT Austin Supreme Court case](#) before class

Pre-Lesson Student Exploration / Bell-Ringer

Before coming to class/at the start of class, students need to:

If not yet completed, use the writing prompts from [1- Subjectivity and Objectivity in Physics](#):

1. What is physics?
2. Do you think physics is subjective (definition: based on or influenced by personal feelings, tastes, or opinions) or objective (definition: not influenced by personal feelings or opinions in considering and representing facts & not dependent on the mind for existence; actual)? Why?
3. Do you think racial diversity in physics is important? Why or why not?

[Optional: Have students read about the [Fisher vs UT Austin case](#) before class]

In-Class Investigations

Discuss: Does racial diversity in science matter? [30-45 min]

- a. *Small-Group Discussion:* Choose any combination of the following prompts to engage the students in discussion.

If you have done [Unit 1 - Data Analysis](#), start with the prompt below.

- i. There is a racial gap in science (at the [national](#) level and at <insert your school here>). Does it matter?

If you have not done [Unit 1 - Data Analysis](#), start with any of the following.



- ii. In the [2016 Fisher vs UT Austin Supreme Court case](#) regarding affirmative action policies for admission into college, [Chief Justice John Roberts asked](#), “*What unique perspective does a minority student bring to a physics class?*” Why do you think Roberts brought up physics, specifically? How would you respond? (Some use the [‘Emotional Check-in’ sheet](#))
 - iii. To what extent does *who* does science influence the science that’s done?
 - iv. Do you think *racial* diversity in physics is important? Why or why not?
 - v. A previous student studying this unit made the following statement:
“I feel that since physics is a fact-based class, racial diversity is not as important as academic diversity; I think that students capable of accurately interpreting ideas in physics lend more to the class than what background they came from. (This is specifically about physics.)”
 Do you agree with this statement? Why or why not?
- b. *Large-Group Share Out*
- c. *Reflective Writing:* What is your response to Justice Roberts’ question, “What unique perspective does a minority student bring to a physics class?”

Instructor Note:

Prompt (i) will be most impactful if you insert statistics from your own school, if available. For example, [here are some data](#) taken from students at University Prep, Seattle, WA.



In Prompt (ii), students may be interested in discussing tangents like affirmative action, but this lesson will flow better if it is anchored in Roberts’ quote about diverse perspectives in a physics (or other science) class.

Class discussions around this topic frequently do not reach consensus. The homework readings are designed to help students educate themselves and then report their findings to the class during the next meeting.

Post-Lesson Homework

Write an analysis

- a. In the 2016 Fisher vs UT Austin Supreme Court case regarding affirmative action policies for admission into college, Chief Justice John Roberts asked, “*What unique perspective does a minority student bring to a physics class?*” Multiple responses to Justice Roberts’ question have been linked below. Read the first one (from Physicists) and any two other responses.
 - i. [Response: What unique perspective do white students bring?](#) - Physicists
 - ii. [Response: Science depends on “Who”](#) - The Atlantic
 - iii. [Response: Is physics just facts?](#) - Physics Today Editorial
 - iv. [Response: Why must ‘they’ justify their existence](#) - NYTimes
 - v. [Response: What minority students bring](#) - UT Physics professor
 - vi. [Response: Statement on Diversity in Physics](#) - American Physical Society



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- vii. [Response: Statement on Fisher vs UT Austin](#) - American Association of Physics Teachers
- b. For each of the three responses you read, write an analysis:
- i. What do you notice?
 - ii. Is the response deontological or consequential? How do you know?
 1. **Consequential**: Basing actions on the good consequences that will result. For example, the physics research community benefits from diversity in the following ways: diminished bias in reaching consensus on research foci and results, improved problem-solving ability, increased creativity, and production of highly-cited work published in high-impact journals.
 2. **Deontological**: Basing action on a morale value or because it is the “right” thing to do. For example, ongoing efforts to diversify physics are a matter of justice.

Homework Debrief: Discussion on responses to the Roberts’ quote

Debrief with students about their thoughts on the various responses to the question of unique perspectives brought by minority students in physics. You may wish to bring in ideas from this [Nature article](#), which suggests that “bibliometrics suggest that teams with greater ethnic diversity generate papers that make more of a splash in the scientific literature”

Resources

- [Lesson Plan Resources](#)

Notes from the Authors

1. Different teachers have different approaches to sequencing the lessons from Unit I. Your choice of which prompts to focus on in the “In-Class Investigations” section may depend on whether you introduce the statistics first as motivation (using the [Unit 1 lesson on Data Analysis](#)) or argue for equitable representation as beneficial first (using the [Unit 1 lesson on Subjectivity in Science](#)).
2. Although the homework references Justice Roberts’ question from prompt (ii) in “In-Class Investigations”, it can be completed even if that prompt was not discussed in class.
3. The conversation about diversity can quickly become stale and politically correct, e.g., “Diversity is great!” “We love diversity!” We recognize students may not feel comfortable expressing certain opinions to a large class. It may help to introduce two (or more) illustrations of these opinions that come from previous students or current sociopolitical statements. For example, one student wrote about the importance of academic diversity in the physics classroom (in contrast with racial diversity). This is included in the lesson plan (prompt (v), “In-Class Investigations”) to stimulate conversation.

