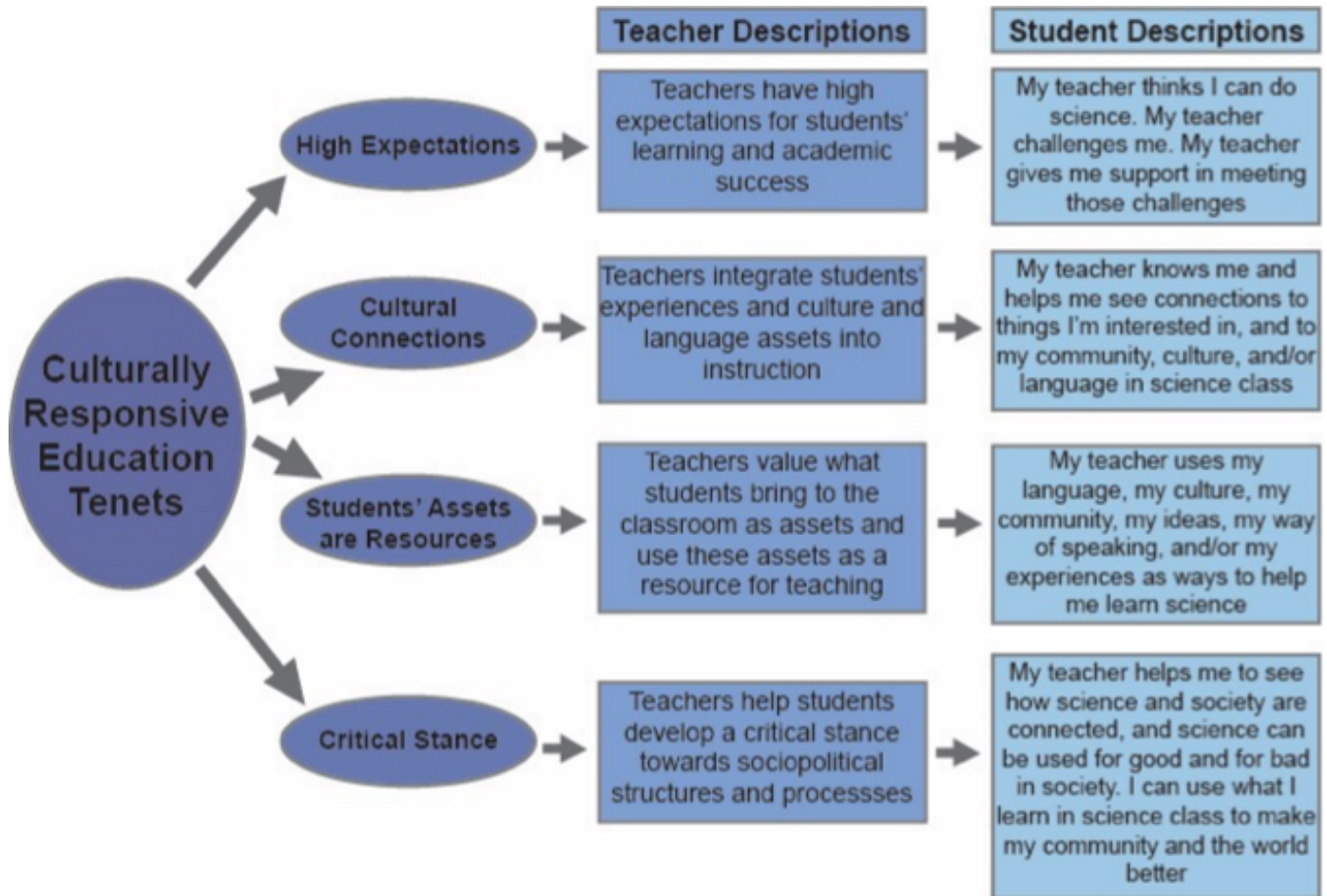


**Investigating Culturally Responsive Science Teaching:
A Cross-Case Analysis of Ten Science Teacher Case Studies ***
AAAS Noyce Virtual Workshop, September 10, 2026



* Suggested Citation: Wallace, J., Howes, E. V., Clinton, S., Edmondson, E., Ellington, A., Fantacone, D., Gjelaaj, A., Hopkins, M., McMahon, M., Mikochik, L., Nolan, S., Riccio, S., & White, J. (2026, September 10). *Investigating culturally responsive science teaching: Exploring insights from a cross-case analysis of ten teacher case studies*. Virtual workshop presented by AAAS Noyce.

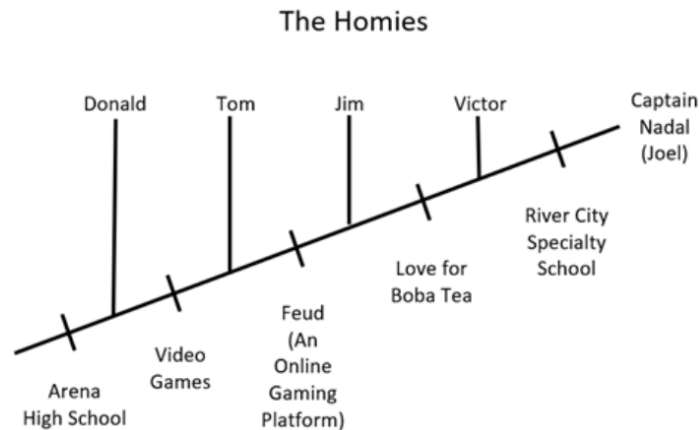
Table 1. Teachers and Schools

Teacher	Setting	Region	School type	Features	Student enrollment	% Economically Disadvantaged	Student body (largest demographics)
Bailey	Urban	Northeast	9-12	Sing-ed	280	88%	56% Black or African America, 15% Hispanic or Latinx
Frances	Urban	Northeast	9-12	Project-based assessments	319	86%	61% Hispanic or Latinx, 25% Black or African American
Helen	Rural (1st), suburban (2nd)	Northeast	9-12 (both)	NA (1st), NA (2nd)	345 (1st), 558 (2nd)	51% (1st) 44% (2nd)	84% white, 8% multiracial (1st)
Jamal	Urban	Northeast	6-12	Sing-ed	417	77%	80% Black or African American, 11% Hispanic or Latinx
Joel	Urban	Mid-Atlantic	6-12	Specialty	300	NA	60% Black or African American, 25% Hispanic
Kelly	Suburban	Mid-Atlantic	9-12	Specialty programs: IB and Arts	1,300	90%	70% Black or African American, 7% Hispanic or Latinx
Margaret	Rural	Northeast	9-12	Located near reservation	330	45%	64% white, 28% American Indian or Alaska Native
Mary	Rural	Northeast	7-12	NA	266	58%	95% white, 3% multiracial
Sally	Suburban	Mid-Atlantic	6-8	Gifted and talented program	750	52.90%	62% Black or African American, 14% white
Skyler	Urban	Northeast	6-12	Sing-ed	279	69%	44% Asian, 32% Black or African American

Joel: Making Cladograms Using “Families”

9th grade, Biology, Classification and Evolution

Joel tells the class that “We are going to talk about cladograms. We are going to do an example with your ‘family.’” Joel uses air quotes for “family.” He continues with “I made my own cladogram last night and I want you to tell me what it is telling you.” Joel draws the diagram on the Smartboard.



Joel hands out index cards and tells students: “Write down as many questions, observations, and inferences that you have about The Homies cladogram.” As Joel circulates the room, students hand him their index cards. Joel reads these aloud and responds to questions about his “The Homies” cladogram.

Then Joel asks, “Which of the homies has a love for Boba tea?” Several students in the class in unison say, “Victor.” Joel replies, “Yes. His family owns a Chinese restaurant. He made his own Boba tea shop. ... He has a love for Boba tea and I do too.” Then Joel asks, “Which of the homies has a connection to River City Specialty School?” In unison, several students replied, “Just you.” Joel responds, “Yes, just me.” Joel says, “We all have families like The Homies.”

Joel then instructs students “to create your own ‘family’ cladogram. You can create any type of cladogram you want to create, on a reality TV show, an anime, whatever you want to use. Here are the requirements.”

Jamal: Sea Level Rise Scenario

12th grade, Environmental Science, Natural Hazards

Jamal welcomes each student as they enter the classroom. Students take their seats and begin responding to the Do Now: "Imagine that you were given \$700,000 to build a house/condo/apartment. Which city would you choose to build in if it HAS to be one of the following cities?" Upon completion, Jamal asks which cities students chose and why. After some discussion, Jamal offers more context:

I want to give you some more information and see if your opinions have changed. [You have] two months before you break ground to start building your house. ... All the cities on this list are threatened with sea level rise, but ... in some areas, sea level is rising faster and in some slower. Once you build this house, you have to keep it for five years before you sell. [Look at the questions and then consider] would you change your location?

After a few minutes, Jamal asks who changed their cities based on the new information. One student responds, "I changed to Queens. I'm from NY and I have more faith that it'll be secure." Another shared, "I changed to Boston, they're rising but rising slow. One inch every eight years." Jamal then asks who decided not to change their city. One student offers, "Even though sea level is rising, there are still pros to living [in Houston] – beautiful houses, lower taxes." Two others contribute, "The rise is low. I still have some money left over from the investment.... I can still work and build up my money" and "I agree ... I would stay in Houston and take that risk."

Jamal then asks, "Can you connect this to reality?" One student comments, "Yeah, when people's houses [are knocked] down with flood." Jamal asks, "Is this a question that people actually have to consider? Can you think of a location where sea level rise—" and students immediately interject with "New Orleans," "Miami," and "Los Angeles." More students raise their hands and the conversation continues.

Skyler: Students Discuss the Work of Coal Mining

10-11th grade, AP Environmental Science, Fossil Fuels

As part of a lesson examining the pros and cons of coal as an energy source, Skyler shows a video from the perspective of coal miners about the nature of their work. It is narrated by a coal miner who says that being a miner provides “a good living, is good honest work.” Other miners in the video talk about their families, and one says, “For the past 20 years I’ve never been laid off ... now it’s a little scary.”

After the video, Skyler reminds students that “We’ve been talking about coal – the pros and cons.” Skyler instructs students to talk with others at their tables about the “negatives and the positives” of using coal for energy. After groups have time to talk, Skyler asks for students’ ideas.

Ilya says “My table [says] no [to using coal]. Yes, it provides jobs but they’re destroying their bodies ... On their knees for so long ruining their ligaments [and they] have no mask on, breathing in fumes.” Ilya summarizes with “It’s a fossil fuel” which puts “carbon into the air.”

Thayer supports Ilya’s comment, saying that the work was “very dangerous,” at which point Skyler asks the class, “What are you going to tell somebody if this is the way they make their living?”

Jem says, “One of the guys mentioned they’ve never been laid off [and that a] lot of people are not willing to risk their life, their health.”

Davi added that this work might be the “only way they know.”

Finn’s comment was the last: “I want to add on to this ... they value the physical work.”

Kelly: The Stoichiometry Recipe Lab

10th grade, Chemistry, Stoichiometry

As part of a unit on stoichiometry and practicing conversions from English to metric, Kelly introduces the Stoichiometry Recipe Lab by saying, "My aunt can make really good Pho. I will eventually get the recipe from her because I don't want to lose it. I want you to share recipes with me. Does anyone have a recipe that [someone in your family] makes that you really like?"

Students name dishes including biryani, jambalaya, zucchini pasta, and lasagna. Kelly then says, "For this project, figure out which recipe you want to use. If it is a family recipe, talk with your family about it. If you make the recipe for the class, there will be extra credit."

Next, Kelly provides an example, "I like baking cookies, right? I might put my cookie recipe here. List all of the ingredients with the amounts. Choose a recipe with 5-10 ingredients. Write detailed directions. For cookies, if I say, 'mix it and throw in the oven', what is missing?" A student replies, "The directions." Another student asks, "What if I don't know the recipe?" Kelly responds by telling the student to talk to his family.

Then Kelly asks, "Do people in Europe measure in cups and tablespoons?" In unison, several students respond, "No." Kelly says, "Convert all of your [ingredient] amounts to metric units." Lastly, Kelly asks the students to start brainstorming ideas for this project: "For the next 5-10 minutes, start thinking about what recipe you want to use. Link it to your personal interests. I will be walking around to hear what you are making."

Frances: Extreme Earth Events Conference

9-10th grade, Earth science, Dynamic Earth

The classroom is set up with black lab tables arranged in a “U” opening at the front of the room, rather than in their usual rows. Students take their seats at the tables, with their posters in front of them.

At the beginning of the conference, Frances emphasizes the science communication objective of the research project saying, “This is something real scientists do.” Showing a slide with a photo of herself presenting at a science conference, Frances comments to the class, “These are posters at science conferences ... Scientists share their research by making big posters just like you have done It is important for every scientist to be sharing their research.” Frances says that what students are doing today is “The 3rd annual Extreme Earth Events Conference.”

During the conference presentations, students complete note catchers for each of their classmates’ projects. The note catchers are provided in both English and Spanish.

One student, Ilán, presents on the eruption of the Cotopaxi Volcano in Ecuador. When asked why they chose this Earth event, Ilán explains it is because their parents are from Ecuador, and Ilán didn’t know that there were volcanoes there. Ilán comments that they really liked this assignment, because they could take facts that they learned and put them into this [poster format]. Ilán also liked the idea of being able to share with other people. Considering the human impact of this event, Ilán commented, “1000 deaths, loss of crops, contaminated water, houses destroyed, lack of air quality.” Another student selected the Mexico City 1985 earthquake for their event. They commented that they chose this event because so many people died.

Margaret: Creating a Model of a Marshmallow in a Syringe

11th Grade, Chemistry, Ideal Gas Laws

Margaret Jericho is a high school chemistry teacher in a rural school district. Her 11th grade chemistry class consists of 14 students, ten male and four female. The students sit in pairs at desks aligned into three rows and columns. At the front of the classroom is Margaret holding a tiny marshmallow. She poses this question to her students: "What will happen to a marshmallow when we put it inside a syringe?" She instructs the students, working with their desk partner, to draw a diagram depicting what they think will happen to the marshmallow inside the syringe. No further instruction is given.

While walking around the room, a student calls Margaret over and asks, "Are we pushing the syringe in or pulling it out?" Margaret responds, "Great question! You tell me in your diagram which way you are going with the syringe. Using arrows would be great!" She says this loud enough for the entire class to hear.

After some time, Margaret goes back up to the front of the classroom and calls for the students' attention. With a marshmallow in a syringe, she slowly pulls and pushes on the plunger, and expresses to the class, "This is how lungs work!" However, in explaining the demo to the students, Margaret had her explanations of inhaling and exhaling backwards. A student noticed this and after looking at their diagram, tells Margaret, "You have it backwards." Margaret gracefully owns the mistake and says to the class, "You're right! Sorry!"

Next, Margaret poses another question to the students, "How could we open a bag of chips creatively?" Several students shout out their responses one at a time: "Rip them open" and "With scissors." Finally, one student says the two words Margaret was hoping to hear, "Vacuum pump!"

Small Group Discussion 1: Vignettes

- Decide in your group how to divide the vignettes.
- Read one vignette each (5 minutes).
- Then discuss:
 - What connections, if any, do you see to these CRE tenets in your vignette?

Small Group Discussion 2: Guiding Questions and Themes

In what ways do the findings reflect, add to, or contradict what you believe about culturally responsive science teaching?

What connections can you make between this study and your own research?

What connections can you make between this study and your own teaching?

- A. Cultivating a welcoming science classroom
- B. Using a variety of ways to connect science content to students
- C. Connecting science to society and thinking critically