Why Culturally Relevant Science Teaching is Vital in Our Classrooms

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When asked about being a “culturally responsive teacher,” some science teachers may comment that they involve their science students in one of the following scenarios, hence they are, in fact, culturally responsive teachers:

• Celebrating Black History Month by featuring the work of Benjamin Banneker, Percy Julian, Mae Jemison, Marie M. Daly, Alexa Canady, or Charles R. Drew (but only in February)
• Hanging a poster of female scientists on the wall of a science classroom
• Participating in a Zoom with BIPOC (Black, Indigenous, People of Color) scientists
• Celebrating Cinco de Mayo or other holidays with foods and dance

Being a culturally responsive teacher (CRT) is much more than merely mentioning the contributions of BIPOC scientists or inviting them into our classrooms as role models. According to Gloria Ladson-Billings, who has written extensively about culturally relevant teaching since the 1990s, being a CRT means embracing three pillars in our teaching to ensure all students are successful:

1. Academic success: a focus on students’ learning; using the students’ prior experiences, frames of reference, and learning styles of BIPOC to make science learning more relevant to them. Cultural competence: an attempt to embrace their cultural competence and not to extinguish the students’ own culture, history, and stories.

2. Sociopolitical consciousness: to increase the students’ sociopolitical or critical consciousness through deep conversation, exploration, and investigation.

To Ladson-Billings, “that’s an all-or-nothing proposition—you can’t do one or two and say, ‘Oh, I’m being culturally relevant. You’ve got to do all three things.’” (Fay 2019).

Being a CRT means building bridges between the classroom and the community. Engaging students in community issues makes science authentic, meaningful, and affords the students the opportunity to showcase their knowledge in ways that in-class work does not. Schools and teachers that are culturally responsive see it as their responsibility to break down barriers in order to help students negotiate their three worlds of school, home, and peers.

Kopkowski (2006) further offers: “…it is about understanding students’ home life, their language, music, dress, behavior, jokes, ideas about success, the role of religion and community in their lives, and more. It is bringing the experiences of their 24-hour day into the seven-hour school day to give them information in a familiar context” (p. 1).

Teachers who practice culturally responsive teaching consider themselves as change agents, or to use Henry Giroux’s term, *transformatory intellectuals* (2010, p. 38). They acknowledge the dominant culture of day-to-day teaching practices and curriculum of our schools and question whether equitable experiences are
Teaching is not a neutral practice, but rather a transformational act. CRTs and schools practicing culturally relevant teaching can potentially reverse the cycle of inequality in education, close the achievement gap, address the disproportionate representation of BIPOC students in programs serving students with special needs, and increase the low numbers of BIPOC students enrolling and succeeding in AP science courses. Holding high expectations for ALL students will raise the academic level of all students, not just those high-achieving students.

Many schools do not provide students with inviting scientific spaces where they are given opportunities to engage in learning that is challenging, culturally responsive, and humanizing. Instead, students often zone out, tune out, or tune in to YouTube on their phones while instruction is occurring AT them and not WITH them.

Culturally responsive teaching (CRT) as defined by Gay (2000) means using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them. Culturally responsive teaching has the following characteristics:

- It acknowledges the legitimacy of the cultural heritages of different ethnic groups, both as legacies that affect students’ dispositions, attitudes, and approaches to learning, and as worthy content to be taught in the formal curriculum.
- It builds bridges of meaningfulness between home and school experiences as well as between academic abstractions and sociocultural realities.
- It uses a wide variety of instructional strategies connected to different learning styles.
- It teaches students to know and praise their own and each other’s cultural heritages. It incorporates multicultural information, resources, and materials in all the subjects and skills routinely taught in schools. (p. 29)

As described by Ladson-Billings (1995), CRT recognizes the importance of including students’ cultural references in all aspects of learning.

Becoming a Culturally Responsive Science Teacher

Becoming a culturally responsive science teacher is a career-long process, not something obtained from a two-hour professional development session. It involves constantly learning from and about our students’ interests, their lives outside of school, and the cultural practices in their homes. This knowledge informs our science teaching in rich and meaningful ways.

Validating students’ cultural identities in classroom practices—such as understanding and integrating the students’ family makeup, immigration history and experiences, individual concerns, strengths, talents and interests into the curriculum—enriches our science classroom through the students’ knowledge they bring into our science classes.

Some strategies we can begin to use in our science teaching:

- Promote equity and mutual respect among students.
- Motivate students to become active participants in their learning.
- Encourage students to think critically and challenge students to strive for excellence.
- Assist students in becoming socially and politically conscious (i.e., identifies and extinguishes myths about other cultures).
- Uncover students’ prior knowledge and experience with chemistry, physics, Earth science, life science and other topics in our science curriculum.
- Show interest and encouragement of students’ native language through use of some vocabulary to better communicate with students.
- Make sure the school environment contains regular evidence of contributions/work from individuals with diverse backgrounds, rather than just during a special week or month.
- Use a variety of scaffolding techniques used to enhance instruction.
- Use classroom materials that include stories and perspectives from diverse cultures, as well as materials provided in native languages represented in the classroom.
- Vary our science instruction (e.g., small group, cooperative learning, problem-based learning, project-based learning, inquiry, C-E-R, open-ended investigations), and seek teacher/student interaction through meaningful, deep discussions on scientific topics.
- Display high energy and animation in the classroom.
- Increase the number of learning activities relevant to the real world during our science lessons.
- Acknowledge students’ differences as well as their commonalities.
- Come to understand nonverbal communication within our students’ cultures; e.g., a Southeast Asian student who “smirked disrespectfully” (according to one teacher) didn’t understand that in the boy’s culture, a smile was an admission of guilt and also conveyed “no hard feelings.”
• Have genuine respect for our students’ abilities, talents, and cultural gifts they bring to our science classes.
• Send messages of high expectations and rid ourselves of the deficiency model where we see ourselves as “white saviors” to rescue BIPOC students.

For an illuminating, powerful TED talk, watch The Danger of a Single Story, featuring Chimamanda Ngozi Adichie, a Nigerian woman who relays her story of coming to study in the United States and her roommate holding many misconceptions of life in Nigeria and of Chimamanda, herself. Adichie admits to reading many stories of American life as a young child, believing that all we do is talk about the weather.

We must do more than treat our science students as if they have a single story to tell us. Their stories are beautiful, multifaceted, and engaging. Are we ready to listen and enact change?

REFERENCES

Special Issue: INFECTIOUS DISEASE
Guest Editors: Brooke A. Whitworth and Colby Tofel-Grehl

The COVID-19 pandemic laid bare simultaneously the need for and absence of resources for teachers to engage students in learning about infectious disease (Kafai et al. under review).

With infectious disease largely absent from the NGSS, teachers have been forced to be creative in linking lessons that contextualize and examine key aspects of infectious disease education within the COVID 19 pandemic.

This special issue provides space for educators to gather resources regarding infectious disease and discuss the affordances and challenges they experienced in teaching students about infectious disease during the pandemic.

We engage the Straif-Bourgeois et al. (2014) framework for infectious disease education which delineates three dimensions of epidemiologic education in which to engage learners.

The first dimension of their framework focuses on the biology of disease and viruses as related to individual bodies.

The second dimension of their framework encompasses the epidemiology of disease with a focus on incubation periods and other temporal considerations for the spread of disease.

In the third dimension, the framework focuses on infectious disease epidemiology. The framework explores the impacts of disease on communities, especially those that are marginalized.

This special issue welcomes contributions of articles focusing on classroom learning activities for any of these three dimensions.

TIMELINE:
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